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THE
HUMAN MACHINE

ITS
CARE AND REPAIR

OR HOW TO
DEVELOP THE BODY, PRESERVE THE HEALTH, MEET
EMERGENCIES, NURSE THE SICK
AND TREAT DISEASE

BY TWELVE AUTHORS
EDITED BY W. E. MCVEY, B.S., M.D.

ILLUSTRATED

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Introduction.

NATURE produces diseases and their antidotes. The pharmacist prepares and compounds, but the physician alone interprets symptoms, seeks out their causes and devises the cure. Unless sure of his remedy, it is as criminal to give it to a beggar as to a prince.

Man is the epitome of nature, and has all its elements within him. Its forces are constantly acting upon him, but he may react and make them subservient to his will. **Observing the relations of cause and effect, he is king;** but, failing in this, they become his master, inflicting as penalties all manner of diseases—become a monster that accepts no excuses and knows no mercy, but for broken law wreaks vengeance on the innocent and the vicious alike, making them victims of infinite ills and of the hordes of parasitic life.

That wisdom is better than rubies has gone unchallenged for thirty centuries, until to-day the proverb is doubly true, for the wisdom of the present includes more perfect knowledge of the causes and control of diseases than was attained in any age of all the past. As a correct use of the facts now known to science would prevent most cases of sickness, and **annually save millions of lives,** how important that the masses be taught until everywhere the incantations of the voodoo shall give way to germicides, the darkness of superstition **to the light of biology flooding the world.**

To remain in the front rank of the world's benefactors, the physician, too, must add to the sum of useful knowledge in terms that can be understood. "All that a man hath will he give for his life," and **he should no longer be barred from knowing himself,** from acquiring the best possible knowledge of physiology and hygiene, and from learning to outwit and destroy the micro-organisms that would make him their prey.

To meet these demands is only a part of the purposes of this book, for it has also become imperative that **the profession and the laity should better understand each other.** The doctor has stood aloof from the people too long, to their anxious inquiries has replied in an unknown tongue, and mystified what should have been made plain, until it is not wholly his own fault that **the average individual**

knows less of himself than of almost everything else. You may doubt this statement, or say that it is not true, but the trainloads of patent dopes, the worse than worthless nostrums marketed annually, and the golden harvests gathered all the year by advertising charlatans, prove that it **is** true; and that many of our commonwealths, though providing liberally for the quarantine of cattle and hogs, proverbially fail to appropriate or legislate for the **adequate protection of human life**, emphasizes the density of the ignorance prevailing, even among the generally well informed, as to the causes of disease and premature death.

Education is the only remedy. Encourage study. Disseminate knowledge. Let all be informed upon sanitation and the nature of the more common maladies, and there will come **ability to discern between quackery and skill**, between the false and the true. And the physician's usefulness will keep pace, always, with the advance. Indeed, it is only where there is this intelligence that he can have the unswerving confidence of the patient and his friends, that coöperation in emergencies, so essential to the **highest success in long and desperate combats with disease.**

Parents! We also have a message for you. No longer assume that there is any virtue in ignorance. In a proper way teach the boys and girls, while they are yet innocent and pure, the purposes of each organ, the meaning of awakening instincts, the mysteries of procreation, and **the fearful retributions following misuse of the sexual powers**, instead of leaving them to acquire fragmentary or vicious ideas from impure companions, and, perhaps, to become helpless victims of the vile.

The several departments have been prepared by separate authors who are well known to have had special experience in their chosen fields. To these physicians our best thanks are due for their generous and able assistance.

A strictly scientific classification has not been attempted. As far as possible, plain, simple language has been used, and technical terms avoided. It is not expected that anyone, not possessed of special knowledge and experience, will attempt to treat the more serious forms of disease, but that the information here given will prove most valuable in **preventing sickness, in accidents and other emergencies**, and by enabling all to better coöperate with the physician in his **best efforts to save life.** If the work adequately meets, as we trust it will, the needs of those for whom it was written, we shall not consider that our long and laborious task has been in vain.

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SANITATION.

By W. L. SCHENCK, A.M., M.D.

CHAPTER I.

THE CELL.

All life reaches back through a past eternity, and forward forever.

Science teaches that, since the first created pair, all life begins in a cell evolved through the reproductive tissues of a parent pair of the same or allied species. Wherever we find a cell, we know there was a pre-existent cell. Every embryonic cell, a cell formed by the union of a germ and sperm cell, if higher than an ameba, is endowed with power to proliferate and differentiate other cells, to produce cells like and unlike itself, until it has developed all the various types of cells found in the organism from which it sprang.

Physiologically, the purpose of all life is the reproduction and perfection of life. All the functions of the body begin and end in the microscopic entities out of which it is built, and, although there is division of labor, each works for the good of all and all work as a unit to effect a common purpose. For ages but one life was supposed to be in the body. Now we know that life is a sum of vital units, and that down among these little lives all the living matter of the body, its protoplasm, is prepared, or created, and that each nucleus and nucleolus produces a protoplasm of special chemical constitution and organic function—changes dead into living matter of special type for special purpose, each cell doing its own work in its own way. Were other evidence required to demonstrate the existence of an individual life in each cell it is found in the fact that every cell possesses the power to create other cells like itself, and transmit to them both its improved and debased conditions.

As the reproduced cell is born of the varied activities of all the cells of the body it must partake of their peculiarities. This

power of transmitting inherited and developed peculiarities is called heredity.

HEREDITY.

All developed peculiarities are hereditary, but changes wrought by accident, or the surgeon's knife, are not. Thus the Jewish rite, performed ever since the age of the lawgiver on the eighth day after birth, has wrought no inherited change in the circumcised organ. Disease is not and cannot be inherited, but, as we have seen, special tissue types are hereditary, and must therefore, under favoring circumstances, be predisposed to the diseases to which they yielded in the ancestor. Take courage, then, for by guarding against these tendencies and observing the laws of health, your chances for dying of old age are good, even though your parents were consumptives, but this fortune will require greater care and prudence on your part than is needed by the average child of strong and vigorous parents.

If, through the thousands of generations in which spirit has dwelt in flesh, man had wisely used his intellectual and moral faculties, the millennium would no longer be the hope of a far-off future. So constant, however, have been his violations of the laws of life that, but for his wonderful recuperative power, he would long ago have found a place among the extinct species of the geologic past. Too often he has lived wholly in his animalisms, has neglected or disregarded the laws of development, or become an ignorant slave of passion. He has carefully developed grasses and grains, flowers and fruits, and the animals that minister to his comfort and pleasure, but neglected the improvement of his own race, perhaps, because such improvement required greater effort, self-denial and self-control.

Every stock raiser knows that the improvement of his cattle and horses lies in judicious mating, and gives to it careful thought. With man, too often, fancy, caste, money, lust, are the chief considerations. The procreative act is the most momentous in the life of man, each new generation increasing the magnitude of ancestral errors, yet how many give to it as little intelligent thought as wild beasts of the plains.

THE PRINCIPLES OF HYGIENE.

The laws of life and health date back to the creation of the universe.

He who created life made laws for its procreation, development and preservation; laws which, understood and obeyed, give health and fullness of life; disobeyed, whether ignorantly or knowingly, disease, misery and premature death. Sanitary science embraces all the means by which healthful life is preserved. Two antagonizing forces are ever present, life and death. While the one is continually vitalizing the material out of which the body is built, the other constantly destroys the vitalized atoms. In perfect health there seems no antagonism between these ever opposing processes; the new steadily replaces the old, in more potential form, until development is perfect, when destructive gradually trench upon constructive forces until the body comes to the grave, "like a sheaf of corn fully ripe," and the spirit soars on angel wings. This should not occur until man has reached his fivescore years, for the law of animal life is that it shall extend to five times its developmental period.

A physiological balance between the building and destroying activities is the chief concern of hygiene. The cells destroyed by the attrition of use must be replaced or there will be atrophy, and, when destroyed, they must be removed from the body or they will become toxins (poisons), deranging all the activities of life. The toxins of these dead cells will vary as widely in character as the cells from which they came, and in effect, as widely as the cells upon which they act. Let the removal of dead tissues be prevented and there will be auto-infection (poisoning from within), and diseases of varied type, for disease is a logical sequence of hindered or deranged action among the minute elements of the body. Health lies in the physiological activity of these elements. Keep the body and every surrounding pure through perfect cleanliness, and, with proper nutrition, healthful exercise, regular habits and a cheerful mind, you need not fear disease.

CAMP LIFE.

Camp life was presumably man's first estate. How long before written history the race had camped in caves and wigwams no man knows. Permanent homes and city building are the evolution of the ages. The hygiene of camp life, whether of those who dwell in tents for a summer outing, a camp meeting, a militia service, or of armies in the tented field, is based upon immutable laws, and is, therefore, much the same everywhere.

The selection of a camping place is of the first importance. The soil should be dry, clean and well drained. When practicable there should be a gravelly substratum, and a few large trees to shield from sun and storm, but no underbrush to interfere with the free circulation of the air. There should be an abundance of pure water and the camp must be so situated as not to receive dampness—out of line with winds that bear away the evaporation of rivers, lakes and the like. Latrines should be made at convenient distances from the camp, and where their odors will not reach it or their contents contaminate the water supply. Into them a few shovelfuls of fresh earth, to cover all excrementitious matter, should be thrown every morning and evening.

The camp should be kept as clean as a lady's parlor. The fire furnishes a fit place for the disposal of all waste, and should be kindled every morning and evening when the air is damp or chilly. The tents should be well aired every day, their occupants protected from the chill of night by an abundance of proper clothing, and, as night approaches, extra shawls and coats should be pressed into service. By a careful avoidance of the damp and chill of night air there need be no fear of microbes or periodic diseases, neuralgias, etc.

The food supply should be inspected every morning, and the inspector should know that the cook employs the best methods. For drinks, aside from pure and sparkling water, iced tea, lemonade and ginger ale are always acceptable, while coffee and camp life are inseparable. It is well to have some alcohol in camp to be used in cases of shock, to relieve the first sense of exhaustion, or in case of snake bites, to check the poison, but, as a regular beverage, it destroys the equilibrium of the organism and tends to various diseases.

All habits should be regular, and one-third of the time given to sleep. This rule should be very carefully observed by those who are seeking health. There should be a daily bath, which, if taken in a lake or stream, should not be prolonged beyond fifteen minutes, and should be followed by free friction with dry towels. It should never be taken within two hours after a full meal. Regular hours should be set apart for exercise, which must never be excessive in hot weather, or at any time with those seeking health. Let there be games, books, etc., to prevent ennui, and all business cares be left at home, or, more properly, in the business

house, where they belong. Remember that in an outing the chief thought should be freedom from care and a full enjoyment of the pure environment and abandon of country life. A competent person, clothed with authority to command obedience to the laws of health, should be appointed to select the camping place and to daily inspect the camp.

In the military service of regular armies all officers are presumed to comprehend their duties and to enforce obedience with military rigor, but in the summer camp of state troops there is often a deplorable ignorance of all that pertains to health, and, in consequence, much unnecessary sickness. This was especially true of the rapidly improvised armies of the Great Rebellion, and in the late war with Spain, the fearful penalties suffered in the camps of our volunteers for being officered by men criminally ignorant upon sanitary matters, are too well known to require more than a mention here. Too often the colonel thought the regiment belonged to him and that his straps made him equal to its hygiene. While the work of the surgeon is very different from that of the commander, there will be no conflict of authority when each understands his duties. Where no exigency exists the surgeon should always select the camping place, and supervise all that pertains to its healthfulness, and his directions should be cordially seconded by the commandant.

HEALTHY HOMES.

By healthy homes we mean homes in which shall be built, for God and humanity, strong, useful, happy lives; homes whose environment shall keep away the gaunt arm of disease, secure perfect physical development, and make of the body an instrument whose passions, appetites and desires are in subjection to the higher spiritual life. Such a home will not only be brightened by the light of the sun, but illumined by intelligence, purity and love. The soil on which it is built will be thoroughly drained by proper tiling, and its cellar will be dry and well ventilated. Sunlight will enter every room at some hour during the day, and trees that are so near the house as to prevent the free admission and circulation of air will be removed. Let beautiful trees surround the home, but not be so near as to interfere with sunlight and air.

There must be pure water in abundance, and it must be used not only for drink, but to keep clean the person and all surround-

ings. Every home should have a bathroom, so appointed that its use will be a luxury.

It may cost something to secure a healthy home, but the joy of rosy-cheeked, rollicking childhood, and the health and happiness of the family, are not to be weighed against gold. The anxiety and anguish that fill the home where the rose is supplanted by the lily, where suffering and sadness displace the glee and laughter of healthy, happy children, where doctor's, nurse's and undertaker's bills take the place of those of the carpenter, plumber and gardener, lead to the conclusion that healthy homes are the cheapest.

LOCATION AND CONSTRUCTION OF THE HOME.

The building spot must be well drained, not on a clay subsoil, which is often damp, and never on "made soil," which always contains death-dealing elements. Hilltops and hillsides are likely to be well drained and dry, but valleys are usually damp. On the first range of hills to the windward of rivers, lakes and ponds, constant evaporation often settles. The occupants of homes built upon such hills will suffer from palludal fevers, while those in the valley below may escape, the dampness passing over their heads. The neighborhood of swamps, lagoons and millponds should be avoided. If that cannot be, let the home be on the side from which the prevailing winds blow.

We quote the following from Bishop Haven because it shows so plainly the importance of correct location:

"Two brothers in Vermont, of strong and vigorous stock, and giving equal promise of long and useful life, married wives corresponding in promise of future activity. They both had chosen that healthiest of all callings—farming. One of the brothers built his house in an open and sunny spot, where the soil and subsoil were dry; shade trees and embowering plants had a hard time of it, but the cellar was dry enough for a powder magazine; the house in all its parts was free from every trace of dampness and mold; there was a crisp and elastic feeling in the air of the dwelling. The farmer and all his family had that vigorous elasticity that reminds one of the spring and strength of steel. Health and sprightly vigor were the rule, and sickness the rare exception. The farmer and his wife, though past threescore, have yet the look and vigor of middle life.

"The other brother built his home in a beautiful, shady nook, where the trees seemed to stretch their protecting arms in benediction over the modest home. Springs fed by the neighboring hills burst forth near his house, and others by his barns; his yard was always green, even in the dryest time, for the life-blood of the hills seemed to burst out all about him in springs and tiny rivulets. But, the ground was always wet, the cellar never dry, the walls of the rooms often had a clammy feel, the clothes mildewed in the closets, and the bread molded in the pantry. For a time their native vigor enabled them to bear up against these depressing influences; children were born of apparent vigor and promise, but these one by one, under the touch of diphtheria and pneumonia, sank into the arms of the dreamless twin brother of sleep. The mother went into a decline and died of consumption before her fiftieth birthday, and the father, tortured and crippled by rheumatism, childless and solitary in that beautiful home, which elicits the praises of every passer-by, waits and hopes for the dawning of that day which shall give him back wife and children, an unbroken family, and an eternal home."

In the city choose a home as far as may be from the sources of moral as well as physical pestilence, that there may be sound morals with a sound body, for the physical and the spiritual life constantly exercise reciprocal influences.

Let the home be away from pigsties and barns, cess pits, garbage heaps and sewer openings, and, as much as possible, from the dust of the street, and let the saloon, gambling house and brothel be far removed. Locate the home near schools, and churches, far enough back on the lot to have a lawn, flowers and sunshine, with parks and trees along the street, and make it an educator in all that is beautiful, ennobling and healthful. Whatever debases the intellect and morals tends to physical degeneration, and *vice versa*.

The evolution of man into higher and yet higher types of manhood involves the development, generation after generation, not only of the body, but of the spirit that molds it, to its noblest possibilities. The home must be an educator in all that is man-like, god-like, and never inculcate shiftlessness or helplessness. Much of one's education will be obtained away from home, but the home should rectify and purify it all.

As far as practicable, the home should be owned by those

who occupy it, and day by day it should be made more attractive, so that it will remain forever a green spot in memory—its uplifting influence always surrounding those who have known its peace and joy.

In building we must begin at the bottom, remembering that the foundation is the most important part of a permanent structure. If the location is not dry at all seasons, let the foundation be laid double on a solid substratum of asphalt or Roman cement, to prevent dampness from below and without. All the walls should be double, with an air space between. This space will secure both dryness and warmth. Stone and brick houses should be lathed and plastered, with an air space between the lathing and the wall. If the location be damp, place beneath the timbers a layer of slate, imbedded in cement. The house should be at sufficient elevation to have three feet of the cellar wall above the surrounding surface, that there may be proper cellar ventilation, light and dryness.

The cellar floor should be laid in asphalt or cement. A damp, dark, illy ventilated cellar under the home means pneumonia, rheumatism, consumption, and all disease intensified. It means acquaintance with doctors and undertakers. All cellars must be kept clean, free from dust and decaying vegetables, and should be frequently whitewashed. Sanitary inspection should begin with the cellar. Too many cellars are dark and damp. Many have rotting wood floors and rough walls whose interstices are depositories for all manner of dust and filth, and often, too, they are contaminated by faultily constructed or leaking soil pipes. The grounds about the house should slope from it in every direction sufficiently to carry away all moisture; and they should also slope away from the well and cistern.

All outbuildings should be constructed in conformity with the laws of sanitary art and science, and before the home is occupied it should be inspected by a thoroughly competent sanitarian. Where there are no sewers, the privy vault should be made of iron or water-tight cement, unless placed so far from the house and water supply that it cannot possibly contaminate them. It should be of moderate size and frequently cleaned. That it may be kept pure and aseptic it should receive daily a little dry earth and occasionally a quart of the saturated solution of sulphate of iron. No cess pit should ever be within one hundred feet from the well or cistern, and never on ground higher than the water supply, or near the dwelling.

Paint, kalsomine, whitewash, all are preferable to paper, but if the housewife must gratify her love for the artistic by papering her walls with modern designs, let all old paper be removed before the new is applied. The common practice of putting one coat of paper upon another until many thicknesses have been plastered upon the walls to exhale poisons from decaying paste, and other chemical reactions, cannot be too strongly condemned. All dwelling houses should be painted outside, for paint not only beautifies and preserves but helps to secure dryness.

In no other part of the furnishings is there likely to lurk so much danger as in carpets. They should be taken up frequently and thoroughly cleaned and aired. Hardwood and painted floors, requiring only rugs which can be easily removed and cleaned, are much more sanitary.

CHAPTER II.

EXERCISE.

Exercise is any movement of the body tending to change its molecular elements. In all organic matter the present is the ever-changing, eternal link that binds the future to the past. With properly regulated activities each new link should be better than the old. Evolution is the law of life, life through never-ending changes. Progress requires constant readjustment and renewal. This comes through exercise, and the Creator has ordained it for every organ of the body and faculty of the soul. We may be either slaves or masters, worse or better, through the force of habit. New cells may be made superior to the old. The properly trained muscle gains strength and skill equal to any emergency, and correct mental discipline—well-regulated thought—makes each succession of brain cells better than those displaced, until the mind is enabled to reach out and up, and grasp and utilize laws governing the universe.

Physiologically, exercise is the wisely regulated activity by which, through one of those beautiful compensations so often observed in nature, both the force expended and the atoms destroyed are renewed in more potential form. It is the application of stored-up force to the generation of greater force. Whether life was created merely for the reproduction of species, or for the purpose of changing and vivifying matter until a superadded spirit shall find through it all its possibilities, up to that final step beyond which science cannot go, the continuous change incident to exercise is essential to both physical and spiritual health and development. The functional activity of the organism destroys and removes its atoms while it provides material and stimulus for creating their successors.

Want of exercise, too much exercise, and deficient nutrition, all result in defective development and tend to degeneration and atrophy. Any movement in an organ is exercise though it be deficient, defective or excessive, and exercise in some form is essential to its life, health and efficiency, is an agency through

which nutrients are borne to a part, waste removed, and normal activity preserved or restored.

Exercise is of two kinds—Active and Passive.

Active Exercise may be defined as muscular movements directed by the will. What causes muscular movement, strength and endurance? The muscles, as you know, are only a combination of cells, which, stripped of their sheaths, will hold little more than their own weight, yet the emaciated muscles of an enraged maniac are energized by some unseen force until they hold in abeyance the strongest men. Though muscle cells are necessary to muscular action, there is a power behind them through whose potency they are energized. The mind acting upon the will impresses the cells of the gray matter of the brain in some unknown way, transmits to the motor nerve centers the impulse which, borne to the muscles, gives them power to act in direct proportion to the strength and endurance of the mental impression and volition. It is evident, then, that back of effective exercise lies the power of mind, whose activities stimulate the generation of nerve influence, nerve fluid, neurism, whatever that is. Violent or long-continued exercise may exhaust the power of generating and disseminating neurism, and be followed by atrophy, paralysis, death, but, under proper control and a well-directed will, its force is well nigh boundless. Taken with a little allowance, a man can do what he believes he can—what he wills to do. Who pulls with a will wins the pennant, and who works with a will in any department of life generally achieves success. The lazy lout may have plenty of muscle but it is never energized; he may have plenty of brain cells, but lives and dies without causing even a ripple in the movements of the world. Will power makes the man by enabling him to control and energize all the activities of life. Upon it, more than upon anything else, depend strength of character and a perfect life.

The body is so marvelously constructed, so fitly joined, that impressions made upon any part are in touch with every other part. The proper exercise of an organ not only increases its possibilities, but more or less affects the whole organism. During exercise more air is taken into the lungs—over a third more oxygen being then absorbed, and a still greater proportion of carbon dioxide eliminated. Exercise also increases the frequency and efficiency of the heart's action, so that the blood courses more

freely to all parts of the body. As a direct result of muscle contraction and relaxation there is glandular activity and vascular movement, and what is true of these organs applies with equal force to the nervous system, for muscular action not only increases blood movement and blood supply, but increases nerve power, converts stored up energy into force, furnishes the material to replace that consumed, and stimulates the replacement. Properly regulated, it so invigorates the muscle cells, and their associate organs, that health and development follow. Improperly applied, either exercise or rest may produce pathological changes in the acting organ and in remote parts; thus, through well-regulated exercise vision grows clear and strong, perception more acute, life more joyous, and the vitality of the whole organism is increased; but improperly used, the eye is injured, and diseases developed whose effects are not confined to the injured organ. So, by proper use, the vocal organs develop until they convey in melodious tones the various emotions of the soul, but, improperly exercised, cease to be its servants, and may produce far-reaching disease.

Passive Exercise.—Of the various forms of passive exercise, we will mention only massage, which may be defined as a kneading of the soft parts of the body; a series of systematic passive manipulations. Instinctively we rub or press a part suffering from numbness, or other abnormal sensation. As a preventive and curative measure it is coextensive with the history of medicine. Plutarch tells us that even great Caesar was pinched daily to cure or prevent neuralgia. Galen was appointed physician to the Pergamos school of gladiators, who were rubbed before and after their combats; and every intelligent horseman makes his groom a masseur to his horses before and after racing. The artful “bone-setter,” who pretends special magnetic powers, has sometimes acquired fame through judiciously applied massage. Although it lacks will-force, that important element of all perfect exercise, where active exercise is impracticable, passive exercise is essential. It promotes absorption, increases the volume of the circulation, and relieves engorgement, stiffness and pain.

EXERCISE IN CHILDHOOD.

As a rule, in childhood and youth, opportunity for exercise is the only requirement, but, that each child may receive its full benefits, some approved method of physical training should be

practiced daily in every school. The playgrounds are often too small, but even where ample, some students, usually those most in need of exercise, idly stand during the time for recreation. Every form of exercise should be made attractive and joyous, that the pupils may enter into it heart and soul. We live in our nerve centers. Until they are energized, there can be no free action. Whatever the form of exercise, it should be easily learned, readily practiced, and call into action the whole body. That the important organs within the chest may have full development, all constriction should be removed.

Pupils should first be taught to properly sit, to stand erect, and to take such postures as will give grace and ease to all their movements. Some suppose they stand erect when the chest is thrown forward and the back drawn in, so that a perpendicular line that touches the chest is several inches in front of the face and toes, and one that touches the nates, several inches behind the back of the head and heels. Others think they are erect when the abdomen is protruded, and a perpendicular line touching it is in front of both face and feet; while a line which touches the shoulder is behind the head, nates and heels. Neither is right. In the erect position that gives ease in standing and freedom to all the organs, a perpendicular line should touch the lips, chest and toes, when the feet are at an angle of sixty degrees; and a perpendicular line passing through the body would pass through the shoulder, hip and ankle joint; while one drawn behind the head, shoulders and heels would touch only the nates. The head is thus carried erect, and the perpendicular lines are nearly at right angles with the collar bones. Observing this position for a time, it will soon be taken and maintained without conscious effort.

In sitting the body must also be maintained in an upright position by the muscles, and when bent it should be at the hips. The position must be changed when the muscles become fatigued, but the greater part of the time the body should be erect and rest squarely upon the nates. Every position should give perfect freedom to the organs within the chest and abdomen.

In walking or running, the step should be free and swinging, the head erect, the shoulders thrown back and the chest forward, thus developing grace, comfort, strength and health. Walking and running, combined with a moderate amount of such indoor gymnastics as the dumb-bell, Indian club and rowing machine,

will give a requisite degree of exercise to all parts of the body. When a boy has a woodpile, ax and saw, he can find plenty of useful exercise, though it is likely to lack the mental diversion essential to the best results.

Remember that proper exercise means the vigorous use of every part of the body, and for perfect results must be coupled with joyousness, and that exercise which unduly strains any organ must be avoided. Hypertrophy and irregular action of the heart are frequently caused by excessive exertion. This is especially liable to occur in competitive games, where the ambition of the player, stimulated by the applause of the multitude, calls forth the last ounce of force—an illustration of the influence of mind upon muscle. Daily labor, as well as exercise for health, should be so regulated that all over-strain shall be avoided. Before engaging in active exercise, we should be sure that there are no forbidding conditions; e. g., those laboring under valvular disease of the heart must not run, row or exercise violently in any way.

Model modes of exercise are found in walking, running, rowing, skating, cricketing, horseback riding, etc. The gymnasium has the advantage of furnishing exercise in spite of wind and weather, and in exciting all parts of the body. It should always be well ventilated.

REST.

Rest forms an important part of all systems of exercise, and between it and exercise there should be a well-established mean, differing at different ages, and for different conditions and individuals. Exercise that wears out and removes the developed tissues of all the organs, secures through rest and proper nutrition perfection of form, gives elasticity and grace to every movement, and confers great power of endurance—the fullness of both physical and spiritual life. In the overworked the parts are pressed together, from excessive cell destruction, and there is loss in height and symmetry. Continued health, vigor and cheerfulness lie largely in joyous exercise, alternated with well-timed rest, regardless of the feeling of fatigue, for, while that is a warning against its continuance, we should not always wait for the warning.

TISSUE-BUILDING IN CHILDREN.

That all organs may be properly exercised from early life, the babe should be placed upon the floor and encouraged to kick and roll. It should be taught to creep—an exercise natural to most children and tending to the development of the trunk and limbs. The daintiness which keeps a child from the floor cannot be too strongly condemned. In infancy, childhood and youth, even down to old age, the chest should be preserved as it is found at birth—larger at the lower ribs than at the armpits. When the limbs are strong enough to support the body without injury, the child should walk, run, romp and roll, both in the nursery and upon the lawn. The nurse may find a fit exemplar for proper training in the playful puppy, and encouragement in the perfect development of all its organs.

Before the child can walk, it should be given a daily airing in the baby carriage, and kept out many hours, properly wrapped, of course, in cold weather. It will soon learn to long for its outing, and, when old enough to go alone, it should spend most of its waking hours in the open air.

At the proper age, a portion of its time should be given to work and study, but no work should ever be made a burden and no teaching a task. Both should be joyous. Remember that:—"All work and no play makes Jack a dull jay." The boy tires at the woodpile, long before he has had sufficient exercise. The "sawing bee," in which the boys go about helping each other, destroys monotony and makes the task more joyous. Work or play, to be healthful, should be pleasant. Good humor and a willing mind energize the nervous system and cause the generation and distribution of sufficient neurism to keep the muscles well oiled and free from fatigue.

One of the best modes of exercise for students and those engaged in sedentary occupations, is to keep a ball bounding from a wall. When vigorously played by two or more persons, each alternately stopping the ball, it will bring all their muscles into proper action.

Tissue renewal and building are the physiological objects of all exercise. To accomplish this the material must be at hand, and, that it may be of the right quantity and quality, digestion must be good. Like other organic activities, it requires nervous energy, which should not be exhausted by active exercise, either

physical or mental, immediately before or after meals. For half an hour both preceding and following a hearty meal, there should never be more than quiet, joyous recreation.

THE MORAL TREND OF EXERCISE.

Mental and moral exercise, properly directed, tends to develop and improve the brain as certainly as correct physical exercise gives strength and vigor to the muscles. Cherish, then, pure thoughts, noble ambitions and right aims, for "As one thinketh so is he," and the brain builds on what it feeds.

We have occasional examples of learned men leaving the study for the nursery, and there have been kings who played horse with their little ones, but in the hurry of American life parents do not find time to play as much as they should with their children. This false economy of time is loss, both to the children and the parents. By indulgence in their sports there comes opportunity, through an unseen authority and visible example, of fortifying them against the evils incident to all sports and of wielding an unconscious influence that will be a blessing throughout their lives. Imbibing the spirit of youth, the parent grows young again and keeps young, and, by mingling in their plays, strengthens the bonds of affection and adds to the joys of their early days memories that will never perish.

DEVELOPMENT OF THE HEART AND LUNGS.

Muscular development, as ordinarily understood, is only a secondary matter, for the muscles that form the outer coverings of the skeleton, however important, are dependent upon the health and development of internal organs. It is, therefore, of the first importance that we learn their correct use. So intimate is the connection between heart and lungs that, however widely different their function, they seem but parts of a whole. The heart sends the blood from its right side to the lungs for oxidation and decarbonization, which, after it has been purified and vivified, return it to the left heart for distribution to the organism. So these organs go hand in hand and, although their action is largely involuntary, they are amenable to education.

When we know that many athletes, whose fine muscular development and feats of strength have excited admiration, die suddenly and in early life from failure of the heart or lungs, and that

very many at a more advanced age die of heart or lung trouble, we recognize the importance of the question:—How should we breathe? Their training did not reach these important organs, and the fine superstructure, being without a proper foundation, soon crumbled to decay.

The diaphragmatic muscles assist the lungs in receiving and expelling air, and abdominal breathing is natural to both sexes, but we must not overrate its importance. It is only a part of this vital act. In civilized life very few women breathe abdominally, although many are healthy and long lived, yet were not both abdominal and thoracic breathing essential to a perfect life, we would have been created without the one or the other.

But how should we breathe? When in the proper attitude, with chest free from constriction, take a deep, long breath, continued until the lungs seem filled but not strained. By practicing this conscious breathing several times each day or hour, as you think of it, the lungs will become enlarged, and both respiration and pulsation slower and stronger. If persistently practiced it will soon cease to be conscious breathing, for the habit of deep, full inspirations will become normal, and you will find by measurement that the expansive mobility of the chest has increased, not by building up the muscles about its walls, but by an increase of lung capacity and strength.

In practice, breathing must be both abdominal and thoracic. For the former, breathe as if about to lift the body upward and forward, and, to exercise the abundant cells of the lower portions of the lungs, at the same time lift the abdomen forward. With perfect breathing certain movements facilitate lung exercise and development. Thus, as you take a long, deep breath, keep the arms straight, raise the hands slowly above the head without bending the body, and hold the breath while they are brought down, then slowly exhale. Another aid in lung development is found in bringing the elbows to the level of the shoulders, the fingers touching in front of the sternum and on the same level, then, carrying them backwards, take in as much air as the lungs will hold, retain it while you return the hands to the chest position, then slowly empty the lungs. These movements should be made deliberately, say ten times a minute, practiced morning and evening, when partly disrobed, and stopped when there is a feeling of fatigue.

EXERCISE VERSUS CORSETS.

For boys outdoor sports and work usually furnish abundant exercise. With girls it is quite different. Their work is generally in the house and outdoor sports are too often considered unsuitable, while careful mothers, even among the poor, anxiously relieve their daughters from all burden bearing. Thus there is faulty development of the muscles and ligaments which are to keep in place the organs peculiar to their sex.

In addition to this as soon as they begin to bud into womanhood, when the organs should have ample room for development, the fond mother begins to make them "shapely" with corsets, or other chest constrictors, thus distressing the lungs, stomach, liver and spleen, and pressing down the sexual organs into the cavity of the pelvis. In the lives of most women, there come times when a tub, table, or other article needs lifting. The first act in all efforts of this kind is compression of the walls of the abdomen, by contracting the abdominal muscles. The diaphragm, prevented by the corset from moving upward, presses the contents of the abdominal cavity downward, the poorly developed ligaments give way, and there is uterine displacement, with all its varied aches and pains, and the neuroses for which it stands.

Both sexes are built out of similar combinations of vitalized elements controlled from nerve centers, and, in the main, what is good for the one is good for the other; but woman has some peculiarities of structure, constitution and habit, that merit special consideration. While she may advantageously take physical training, when she finds any form of movement impresses harmfully any part of her organism, it must be moderated until she becomes accustomed to it. It has generally been supposed that woman's power of endurance is not as great as that of man, but if that be true she is an exception in the animal kingdom. Her muscles are not as large, but they are energized by a more active nervous system. She has been so dominated by the iron heel of fashion that her physical system has been handicapped. Perfect development requires the free play of all the organs. Though Greek statuary shows the perfect conception of the ideal woman as possessing strong and ideal proportions, wasp waists have been the fashion for centuries, and, among all civilized nations, have been so assiduously cultivated that you can scarcely find a woman who breathes naturally, both thoracically and abdominally.

Although there has been some amendment among women of culture, the "butterflies" still fasten their corset cords to the bed-post and throw their weight upon them to reduce their waists to the smallest possible compass. Few physicians have failed to notice women whose floating ribs overlapped the stomach, until forced to wonder where they kept that important organ and its fellows of the same region—the liver and the spleen—and to mark grave disease as a consequence. Nature has assigned a place to each organ, and an organ can be displaced only with injury to itself and such displacement of its fellow organs as to invite far reaching disease. Most women become indignant when lacing is suggested, yet abdominal breathing has become so rare among civilized women that some supposedly learned physiologists have taught that only thoracic breathing is natural to woman. A little investigation, however, shows that the latter is natural only to her who is civilized!

Those accustomed to the corset complain that when it is left off there is a sense of weakness, a lack of support that is uncomfortable. They want it to hold them up—the best possible argument against its use. Nature has provided muscles for the support of the body, and it is the corset that has prevented their proper growth. In slender, delicate women nothing secures development like freedom from constriction—breathing so as to secure chest expansion and the proper use of chest muscles; and nothing so reduces obesity and prevents unseemly protrusion of the abdomen as this freedom and exercise. They promote in all perfection of form, grace of movement and clearness of skin. Sallow complexions, hollow chests, spinal curvatures and protruding abdomens are the logical results of the corset. Do not wear it.

OUTDOOR LIFE

Nothing else so perfectly overcomes the irritability and nervousness quite common to womankind as outdoor exercise, that calls into play all parts of the organism, followed by rest in the horizontal position, or so perfectly develops all portions of the body, giving grace to form and movement. The idea that work is disgraceful is disreputable. The woman who takes pride in doing her own housework, who does it with a will, and enjoys keeping her home in order, will escape the wear and tear of soul and body incident to the management of the average servant, and,

in three hours in the morning and two in the afternoon, will do all the work of an ordinary house, kept neatly and plainly, and do it satisfactorily. Like Bridget, she may dawdle over it all day and, feeling it a hardship, soon grow tired and lose the joy and benefit of the exercise it furnishes, but by energetic, hopeful, happy work, followed by a refreshing bath, clean linen, rest and an afternoon airing, she may enjoy perennial health and a form and complexion outrivalling those of Venus.

It has frequently been remarked that, in high, salubrious tableland and mountain districts, men are healthier than women—a condition due in part to the nervous irritation common to such altitudes, but largely to the outdoor life of the men and the secluded lives of the women. To get the full benefit of pure air one must spend much time outdoors. As a class, women lead too sedentary lives.

Walking and running are among the best forms of exercise, but women get out of breath from lack of practice. Then, too, they have corns and bunions—for pride in small feet is not peculiar to the Chinese woman—which greatly interfere with graceful movements and continued exercise on foot. The shoe should be large enough and, what is quite as important, should fit the foot. If the toes be well turned out in walking, the practice will tend to prevent forward contraction of the pelvis.

BICYCLING.

Although the bicycle is very popular, and its swift, easy motion a fascination, it has positive demerits as used by the average rider, and comes far from furnishing a model exercise. It calls into action the pedal extremities, and may develop esthetic calves, but leaves many organs of the body only poorly exercised. Few riders take the proper position for sitting or riding; the head is lowered, the face turned up, the neck unnaturally bent, the shoulders and back humped, the chest and abdomen drawn in, and the body bent at an acute angle at the thighs, pushing the pelvic organs out of place and throwing the weight upon the prostate or vulva. If the seat be too narrow, the soft hip bones of young girls are pressed together, the opposite condition from that prevailing when the weight of the body rests naturally upon the widely separated heads of the thigh bones.

Bicycling violates a fundamental law of correct exercise—fair

play to all organs—but, if the wheel be ridden, the body should be maintained in an erect position, while the saddle should be easy, firm and elastic, and permit pedaling without friction. Many saddles in common use are adapted to the male rider, but the smallest number recognize that the pelvic organs of the two sexes are not built after the same pattern. If the pommel is high it interferes with the dress of the lady rider; if too low, she slides forward and is uncomfortable; if narrow, fleshy women chafe; if broad, those who are thin complain. A saddle perfectly adapted to the female rider has not yet been constructed.

Among the good things for which the bicycle stands, is another evil which must not be overlooked. Everyone, when first riding the wheel, finds it prone to fall upon one side or the other, and that constant watchfulness and effort are necessary to keep it in balance, and an old rider, in rapid motion, more than the locomotive engineer, needs a watchful eye, for his track is often full of obstructions. As the rider gains mastery of his machine, the effort to keep it in balance seemingly disappears, but the rapid movement, at full speed, is so fraught with peril as to demand constant attention and will-force, which, when long continued, bring the anxious expression, always a danger signal, seen in the face of the professional cyclist. Although the bicycle is beneficial to those who use it for short periods only, in proper position and at moderate speed, and although it ministers to the American habit of haste, it is not as healthful to the sedentary as a walk to and from the office.

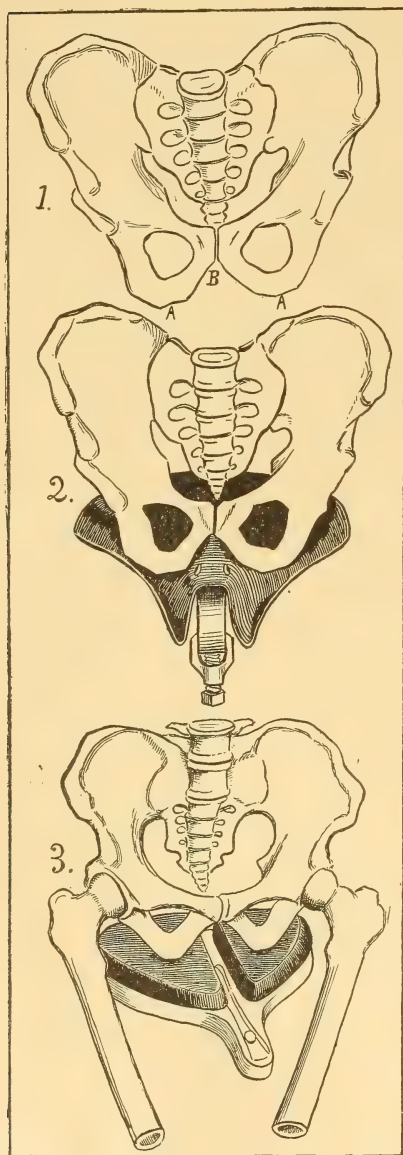
Cycling in any but the best way involves loss of pleasure and profit, and may cause both functional and organic injuries. We tell the beginner to sit up straight, and he assumes a perfectly erect position, perhaps bringing the coccyx in painful contact with an improperly constructed saddle so that the spinal column suffers injurious jars, and making progress wholly dependent upon the muscular action of the legs. The would-be professional bends the body at a very acute angle at the hips, draws in the chest and abdomen and humps the shoulders, compressing the vital organs of the chest and pressing the contents of the abdominal cavity into the pelvis. This position is full of danger to every rider who assumes it, and especially perilous to women and girls. It is void of art and science, prevents continued action, injures health, and is far from being esthetic.

The following excellent suggestions on the saddle, by Theo. R. MacClure, were brought out at a recent sanitary convention in Detroit:

"The bicycle seat should have the same relation to the rider as does the properly constructed chair; it should be flat, rigid and

fixed in its shape, and at no time should any portion of the seat cause undue pressure upon parts in one of the most delicate regions of the human economy. To better place this portion of the subject before the reader, we have, in connection herewith, three illustrations—Figs. 1, 2 and 3.

"Fig. 1 represents the bony pelvis of the human being. The two prominences marked 'A' are the ischial tuberosities upon which the weight of the body when riding a wheel should rest. 'B' exhibits the pubic arch, which protects a portion of the anatomy upon which the weight of the body should never rest, for any considerable time. The pubic arch is nature's protection for some of the more delicate and sensitive parts, among which are the prostate gland, the bulb, urethra, etc. Any condition which shall interfere with nature's arrangement will throw down the bars of protection, and sooner or later result in permanent and serious injury. The insidious way in which these injuries gain a foothold misleads the one being injured; and, while there may be premonitory symptoms or



warnings, they are not such as to be observed until too late, when the injury has occurred.

"Fig. 2 represents the bony pelvis seated upon the common hammock saddle, the saddle against which we should guard. It will be seen that the weight of the body ceases to be supported by the ischial tuberosities, but is supported by that portion of the body called the perineum.

"Fig. 3 exhibits the bony pelvis resting upon a flat rigid seat, the weight of the body falling upon the two bony prominences of the pelvis. The seat represented in this plate consists of two separate pads or cushions, between which is a groove or depression, about one inch across, for the better protection of the perineum from pressure. Any bicycle seat made upon the plan exhibited in this plate will be less likely to cause injury to the delicate portions of the body situated in the region of the perineum. The horn should be free from sharp corners, and padded or cushioned when practicable.

"The pelvic bones vary, so that in some, especially in females, the tuberosities are closer together than in others. The seat should be wide enough to permit these bony prominences to rest comfortably upon the pads. It is equally important that the seat be not too wide, in order that the pedaling can be accomplished without unnecessary friction or chafing by the edges of the seat."

When the saddle is too far back or too low there is loss of power, while the unduly bent knees become painful, the ankles lack freedom of action, the shoulders are humped, and progress up hill is barred. Fat persons prefer the low saddle because it facilitates mounting and dismounting, but the position is neither graceful nor healthful. The other extreme must also be avoided. When the toe just reaches the pedal, it involves an injurious and awkward twist of the back and sides, and a loss of power, especially on up-grades. The saddle should be well over the pedal and its height will be right for a person sitting upon it when he can place his foot under the pedal, the pedal resting upon the instep. Persons of different heights should not use the same adjustment. It is important that the seat be neither too hard nor too soft. When the body rests properly upon it the weight will be supported squarely upon the pelvic bones, with trunk at right angles to the tilt of the saddle. If the handle bar is too high there is an un-

comfortable and unseemly bend of the elbows, and the position is unsteady.

LEFT-HANDED PEOPLE.

There is another subject that has not been sufficiently dwelt upon by those who have discussed exercise. The Creator does no unnecessary thing, and the work of the hygienist, and the true physician, is to see the work of the great Architect well done rather than to make substitutions. In all vertebrate animals the nerves and muscles are usually in pairs. Man is no exception to the rule. Children are born with both sides equal in form and function. Heredity may in some instances make a difference, but that is the rule. They are also born weak and helpless and almost wholly void of instinct. From the cradle to the grave all the faculties are developed by education. Nature yields to the teacher, and the babe is hardly born before its education commences.

When or why man became right sided is not within the scope of our discussion, but the exceptions are too numerous to prove it a physiological law. Most persons are dexterous, right handed; but whole tribes have been ambidextrous, left handed. In the earliest history of the race, Moses tells us the tribe of Benjamin was left handed, and adds: "They were mighty men of war." From the fact that, in certain vocations, men use either hand with equal facility and the more important fact, that man is born with his nerves and muscles equally paired, we conclude the Creator designed that man should use with equal convenience the right and the left hand, and that the employment of either alone is a human innovation, but no improvement on the divine plan.

Ninety per cent of the peripheral nerves cross each other as they pass to the nerve centers in the brain. As already stated, the properly directed exercise of an organ develops both its form and function. The nerves are developed, not only in the acting muscles, but in the nerve trunks and centers as well. When the right muscles are alone or largely used, the right brain is proportionately functionless, while in the left are stored the results of our actions, perceptions, and memories, and here the will is chiefly functioned.

We are not surprised to know that in such diseases as aphasia (loss of word memory), there is usually softening in that portion of the left brain where the record of words is kept, the third left frontal convolution. The exceptions to this rule are among the

left handed, and this theory of right handedness is confirmed by such cases as that of Prof. Lourdet of Montpellier, France, who, having lost both the power of speech and the use of the pen, taught himself the use of the left hand, and, letter by letter, and word by word, learned again to write and speak.

By exercising both sides of the brain, as by the use of both eyes, they are enabled to give to each other mutual assistance and rest, and when, from injury or disease, one loses its function the other may take up its work, but when either right or left sidedness alone is developed one hemisphere of the brain is held in abeyance, or dwarfed, and there can be no exchange. The health and development of the nerve centers and brain, the co-operation of the peripheral nerves and the development and strength of the muscles, in short, a full, harmonious and symmetrical development of all the organs of the body, is involved in the equal training of both its sides, and he who would possess complete control of all his organs and faculties must continue such use through life.

THE ATHLETE.

Man differs from other animals, only as he has a superadded spiritual life controlling his will and directing his forces. We have just begun to recognize the power of this will. By it man is able to effect changes in his physical development in a few short years, that require generations in the brute. By careful training, the wild horse has been changed into the fleet-footed Arabian, the massive Percheron and the tiny Shetland, but these results have been the work of many generations, and are preserved only by the most careful breeding and continued judicious exercise.

Sandow, the Prussian athlete, belonged to a family in nowise remarkable for its physique, but through localizing muscle-building, and associating with his training voluntary control, he reached his most wonderful development at twenty-six years of age. At eighteen he was in every way beneath mediocrity. By exercising his various muscles as they required, though only five feet eight and one-half inches in height, he gained a measurement around the chest of 46 inches, about the waist 29, with an expansive mobility of 14 inches under the axilla, over the deltoid 17 inches, over the shoulder 21, over the biceps 19½, around the forearm 19, around the thigh 27, and around the calf 17½ inches. With apparent ease and one hand, at arm's length, he lifted from the floor

straight over his head a hollow dumb-bell with a man in each globe, together weighing 305 pounds, and as easily let it down again. With his feet and hands upon the floor he supported three horses, weighing 2,800 pounds, upon a platform resting upon his chest and knees. Although through volitional control over his muscles he secured this wonderful muscular power, he did not develop spiritual life and control, and was far from being an *intellectual* giant.

Seeking the development of the whole man we must remember that the methods that develop the mere animal organs do not materially impress those through which the spirit acts. From Samson, shorn of his strength by the seductions of Delilah, down to the pugilists of the present day, neither athletes nor gymnasts have been distinguished for their mental or moral force. Many men with frail bodies, without "muscles," have gained as distinguished conquests in the world of mind, as athletes without mind have won in the world of muscle. Aim at neither extreme, and remember that while a well balanced, healthy physical organism is essential to life and intellectual growth, an excessive animal development is a hindrance to both.

If sudden death does not come to the athlete for taxing his heart beyond its strength, his abnormal muscles, to preserve their health, must be exercised in proportion to their development, and to sustain this the digestive organs must be overtaxed to feed them, the circulatory to carry to them their nutrients, the respiratory to oxidize their blood, and the excretory to remove their waste.

For him to stop this exercise is not less dangerous than to continue it. The removal of unused and devitalized tissues is always full of danger. Use his organs as he may, sooner or later he will reach the down-hill grade, when the involution of his massive muscles will invite disease.

COLLEGE ATHLETICS.

Just now a mania for muscular development is manifest in our colleges. The learned professors in some of our leading universities seem to have forgotten that while muscular efforts demand increased activity and development of all the merely physical organs, the athlete does not gain either intellectual or moral force from punch-

ing bags, or kicking balls, and that a student with mind intent on football, or anything else foreign to mental training, and who frequently interrupts his college course to give exciting exhibitions of his muscular powers, is not pursuing the best educational methods and results.

The development of man is in line with his activities. While the health of all the organs of the body should be preserved through regular and moderate use, we think the college should chiefly be a gymnasium for mental training for beneficent purposes. It should not be dedicated to the forcing of the organs of mere animalism. During student life, violent sports are injurious rather than beneficial, and the college contests at football, as described by the press, are in every way demoralizing and differ from the ring only in the character of the actors. Brutality predominates in both. We are aware that its friends claim that it develops courage, determination, will-force, self-restraint, quickness of perception and decision. The same is claimed for the ring. Purpose, determination and decision may be bad as well as good. Surely the fruits of the ring are not the highest exponents of civilization, and may we not expect like results from a game where a half score of players fight with hands and feet, breaking noses, ribs and limbs, dislocating joints, slugging on the sly, and, in some instances, taking life?

Exercise is essential to physical health, but we should understand its laws, and develop those faculties which distinguish man from the brute. Cultivating the merely animal organism does not develop the cells through which the spirit acts, and much time and thought given to exciting sports during a college course are worse than lost. We reap what we sow. Physical exercise in some form is indispensable to health and longevity, and these, in the educated, are of incalculable value both to the individual and to the state, but, develop as he may, man cannot make his physical strength equal that of the ox, and he should not attempt it. God created him for other and nobler purposes. His mental and moral faculties should have precedence. His perfect development does not mean transformation into a behemoth, but the symmetry which secures the perfect health of all his organs, makes his body a fit instrument for the mentality which, laying hold of unseen forces, compels them to drive his engines over land and sea, and

perfects those still higher activities by which he reaches out and up to the infinite.

God alone creates, but to man is given recreative power, enabling him to utilize the varied creations, and, in so doing, to become refined, noble and strong in mental and spiritual action. Of all his capacities, our chief interest is in his will, reason, affections, character. We secure health and the power of endurance to the physical organism that it may be a fit instrument for the activities of the spirit and subject to their control. Man is made in the image of God, not physically but spiritually, and should seek such physical culture as will secure a sound body, but, at the same time, conduce to highest spiritual power.

CHAPTER III.

GERM-LIFE AND ITS RELATION TO DISEASE, AS UNDERSTOOD BY THE BACTERIOLOGIST.

In all the past, contagious and infectious diseases have been the world's most dreadful scourges, so resistless in their sweep and deadly in results as to be generally regarded as vengeful work of offended spirits, or inscrutable dispensations of Providence. But their mysterious power has gone, for having learned their secrets we are able now to combat and overcome them. Of all the discoveries of the present age, none is more wonderful or of more priceless worth than that of the germ causation of disease. It has dispelled the terrors of the plague, stayed the pestilence and added to the years of human life. No class of diseases now yields more readily to preventive measures than the contagious ones; while nearly all the infections have been found amenable to simple laws, and the remaining few are likely to soon be added to the list.

In this revolution the bacteriologist has suddenly become the great benefactor, worthless theories have given place to exact science, and in the medical world nearly all things have become new. It has been fully demonstrated to the satisfaction of the most critical that the causes of these diseases are micro-organisms known as bacteria; that of the very numerous varieties of microscopic life only a few are pathogenic, or disease producing, and that these in almost every case are taken into the system with the breath, food or drinking water. Hence, air, food and water, as the media of infection, possess an interest never accredited them before, and how to get them pure and keep them so has become the main problem of sanitary science—"the science of how to keep well."

The infections or germs which float in the air and are carried into the system with the breath are called *air-borne*; and the diseases thus disseminated are air-borne diseases. Consumption, pneumonia, diphtheria, whooping-cough, scarlet fever, yellow fever,

measles, mumps and influenza belong to this class. It will be noticed that most of them manifest themselves chiefly in ailments of the throat and lungs.

"As the air is breathed by everybody in the same inclosure, the only safety lies in isolation of the patient, and prevention, as far as possible, of the spread of germs into the common atmosphere. The air-borne germs are not always expelled from the diseased person in his breath, but may escape through the skin, and, in throat and lung diseases, are found in myriads in the sputum. If this be allowed to dry in the open air, the germs will be taken up as dust, and some of them will reach the throats and lungs of other people and be implanted there. This is the common method by which consumption, pneumonia and diphtheria are disseminated, and it is even more for this reason than to avoid the disgusting filth that ordinances are made forbidding spitting in cars and many other public places. Indeed, the dust from dried expectorations in cars, hotels, stores, factories, schools, assembly halls, etc., is a constant source of danger, and suppression of the filthy habit of indiscriminate spitting would be a most important step toward public safety.

"When fully developed, pulmonary consumption is still generally regarded as an incurable disease, but it is no longer considered hereditary. One may inherit a physical weakness, a peculiarity of cell, which predisposes to the attacks of its microbe, the bacillus of tuberculosis, but weakness alone cannot bring the disease. The specific seeds must be planted, and these must come from another diseased person or animal, and may enter the system in the food as well as with the breath, for cattle are frequently afflicted with this disease, the microbes of which may be found in their flesh, and, in extreme cases, in their milk."

Typhoid fever, malarial fever, cholera and some of the diarrheas are usually *water-borne*, but as they may be disseminated by any means through which their germs can reach the stomach, food as well as water may be a medium of infection. It is, therefore, of the highest importance that both food and water be clean. By cleanliness, in this connection, is meant freedom from disease-producing germs. It is not enough that water should seem pure, for though pleasing to the taste, and clear and sparkling, it may abound with death-producing germs.

NECESSARY PRECAUTIONS.

Although freezing appears to have very little influence upon many of these germs, they are extremely sensitive to heat, few surviving 158 degrees in streaming steam and none of them being able to long withstand the temperature of boiling water. Hence, by thoroughly cooking food, and carefully keeping it from contamination thereafter, and by boiling all water used for drinking and culinary purposes, and carefully cleansing with water thus sterilized all fruits and vegetables to be eaten raw, the danger of contracting any of these diseases may be very largely overcome. But there are other points of attack which should also receive careful attention. Such pets as cats and dogs often carry infection, and, therefore, may be dangerous to children or others fondling them. Rats and mice, and, still more often, common house flies may become common carriers of these disease germs, hence, if for no other reason, every precaution should be used to prevent them from reaching human food.

Not only are careful personal habits essential to safety, but the amount of general infection should be reduced as much as possible everywhere. To this end individual and municipal efforts should be united in intelligent and unceasing warfare against all kinds of filth and accumulations of decaying organic matter for masses of putrefaction are ideal breeding places of disease-germs—fountains of infection, contaminating both air and water with subtle poisons causing misery and death. For the effectual treatment of these menaces to health see the department of "Disinfection and Disinfectants."

CHAPTER IV.

AIR.

We may live for a time without food or drink, but no one can live without air. The supply is ample, for it surrounds the whole earth, penetrates every crevice and extends above the highest mountain tops, no one knows how far, but to an estimated height of from 50 to 200 miles. Not only this, but provision is made for its constant renewal and purification. Pure air is commonly said to be one-fifth oxygen and four-fifths nitrogen, but absolutely pure air is never found. It may be considered pure when composed as follows:

Oxygen20.61	volumes	} In one hundred volumes of air.
Nitrogen	.....77.95	"
Carbonic acid gas	... .04	"
Aqueous vapor	.... 1.40	"

It will also contain traces of ammonia, nitric acid and carbureted hydrogen and, if in a city, traces of sulphureted hydrogen and sulphurous acid gas. While all the gases of the atmosphere differ in weight, by the law of diffusion they are never at rest, and so intermingle that their proportion is maintained with great regularity at all temperatures and altitudes.

Whatever other functions nitrogen may have, it is a necessary diluent of oxygen. When free or uncombined it is, as far as we know, negative in character. Various combined it is an important element in the tissues of both animals and vegetables. Its proportion in the air is not disturbed by the presence of carbon dioxide or other deleterious gases. They are present at the expense of the oxygen and, when in excess, they are dangerous both on account of their own action and by their displacement of necessary oxygen. Any considerable quantity of carbon dioxide is injurious, but the atmosphere may contain four parts in 10,000 without appreciable influence upon health, and even in much larger quantities it is a measure of injurious contaminations rather than dangerous itself.

Oxygen is the part essential to life. It is the most abundant element in nature, enters into all forms both of organic and inorganic matter, constitutes one-half the globe and, as we have already stated, one-fifth of the air surrounding it. It is a colorless gas, without taste or odor, and at ordinary temperatures is soluble in water to the extent of about two volumes in a hundred. It will not burn, but is the most powerful element of combustion. Apply a blazing match to the end of a tube filled with oxygen and you will obtain no results, but extinguish the flame and insert the incandescent end of the match into the tube, and it will burst into a beautiful flame. It is by supporting combustion that it maintains the heat of the body; taken into the lungs it is carried by the blood to all the tissues and, by its contact with them, they are in part burned up—oxidized, the oxidation producing heat, force, and, as a residuum, carbon dioxide. This residuum is carried in the blood back to the lungs, and by them thrown out to become food for plants. Decomposed in plant cells, through the action of light, its carbon becomes fixed, as a part of organic matter, while the liberated oxygen escapes to be breathed again. Thus the animal provides food for the plant and the plant for the animal, a beautiful example of one of the many wonderful laws of equivalences found in God's handiwork.

The contaminations of the air, also its density, humidity, temperature currents and electrical conditions, have a constant influence upon health, imparting to seasons and localities many of their hygienic characteristics.

The Density or weight of the atmosphere at any given point is affected by altitude, temperature and humidity. The rarified air of high altitudes produces various impressions upon physical life, causing labored breathing from the difficulty in securing sufficient oxygen, excessive heart action to force a larger quantity of blood to the lungs for oxidation, nausea, lowered temperature, convulsive trembling and ocular fatigue, with a sense of languor and indifference. The diminished pressure upon the body often permits the exudation of blood through the delicate membranes of the eyes, nose and ears, and sometimes from the lungs. These conditions are increased by atmospheric movement, and are known as "mountain sickness." Properly selected altitudes, by swelling the capillary circulation of the surface, and correspondingly relieving the congestion in central organs, and by demanding

full use of all the air cells of the lungs, may prevent the development of certain diseases or, if not too far advanced, may cure them.

But in recommending altitude the sanitarian must consider the condition of all the organs of the body. Thus, however advantageous to the lungs, rarefied air increases cardiac effort and is incompatible with various forms of heart disease. Altitude is but one factor of the climatic conditions essential to consumptives, for while, in the early stages of the disease, they need a rarefied atmosphere, they also require dry air, the absence of sudden and extreme changes in temperature, and a climate that woos to exercise and will enable them to spend much of their time out doors at all seasons. Man's adaptability to environment enables him to live in very high and very low altitudes, but idiosyncrasy should always be considered, and for those seeking health extreme changes must be gradual.

Humidity.—Heat, by expanding or rarefying the air, makes it lighter than cold air, and, since the hydrogen in aqueous vapor is lighter than the oxygen and nitrogen it displaces, moist air is lighter than dry air, the specific gravity of air saturated with moisture being less than two-thirds of that of dry air, or, more exactly, as 623 is to 1,000. The warm, balmy air of coasts and sea-girt islands near equatorial regions is hygienic in many respects, but tends to enervate, and such localities are less favorable to the cure of consumption and allied diseases than warm, high and dry tablelands. Knowing that moist air encourages a tendency to consumption, those afflicted with lung diseases should go to the mesas of Arizona and New Mexico, where they will take full deep inspirations and enjoy outdoor life and exercise, rather than to Northern Colorado and Wyoming, where the rainfall is greater and the winters more or less inclement. Cold, damp air produces chilliness, contraction of the capillaries and engorgement of central organs, thus tending to congestions; it also favors the development of rheumatism and the like, while warm, high and dry air relieves such conditions. Study to correctly interpret all the influences of the atmosphere upon health.

Temperature.—In cities, and often in country homes, conditions popularly attributed to high temperature are really due to causes which are largely dependent upon accumulations of filth, bad drainage, poor ventilation, over-work, under-work, intemper-

ance, improper diet, etc. Thus cholera infantum, tropical dysentery and yellow fever were long thought to be heat diseases, but are now positively known to be due each to a specific germ, which upon being taken into the system, especially if from violations of hygienic rules, or for any other reason, the subject is in a debilitated condition, multiplies with astonishing rapidity and develops the virulent poison that produces the disease. In moist accumulations of filth under high temperature these germs find excellent breeding places, until, through the medium of food, water or air, some of them can effect an entrance into the human body. Asiatic cholera and the Bubonic plague have been called heat diseases, but are due to germs which multiply and flourish in the unspeakable filth of the degraded worshippers of Juggernaut, and are dependent upon filth to keep them alive. So with other diseases attributed to heat; high temperature is indeed a necessary accompaniment, but other factors, preventable in nearly every case, are essential to their development. Heat alone is very rarely a sufficient cause even for sunstroke, the debilitating influence of imperfect ventilation, vicious habits, faulty diet, over-work, etc., being a usual accompaniment or prelude.

Low as well as high temperatures have their characteristic diseases; those of the air passages, as influenza, tonsilitis, croup, bronchitis and pneumonia, are some of them, especially when cold is associated with great humidity. They are largely favored by the abstraction of warmth and moisture. According to Dr. Baker of the Michigan State Board of Health, each cubic foot of air inhaled at zero contains only one-half grain of vapor, but when exhaled at 98 degrees is nearly saturated and contains about $18\frac{1}{2}$ grains of water, having abstracted its additional heat and moisture from the air passages. Irritation, inflammation and suppuration are incident to such drains, and are always facilitated by the depressing influence of cold upon the nervous system, the part first affected depending largely upon the condition of the air passages. The lung substance is not usually involved until there has been long continued action. Hence, pneumonia does not generally prevail until February, March and April. Cold, dampness and density favor the development of pulmonary troubles, while the opposite conditions, found in a warm, dry, rarified atmosphere, are preventives.

Air Currents are important agencies in purifying the atmo-

sphere, but are sometimes factors of disease. Warm, damp currents rising from the earth carry contaminating decompositions and infections, and currents passing over bodies of water become moisture laden, causing enervation by day and chill at night. Cold draughts, especially when charged with moisture, tend to rheumatism and neuralgia; and cold dry winds, as the northerners of Texas and the bora of the Alps, are followed by inflammation of the air passages. Dry winds are filled with particles of matter, readily seen when passing through bright sun rays, and while we constantly inhale thousands of these tiny motes without harm, if composed of infectious or contagious matter they may cause most serious epidemics.

Dusty country air is far less injurious than that taken up from the streets of villages and cities, laden with dried and pulverized droppings of cattle and horses, and sputa of consumptives and other invalids. What condemnation can be too severe for boards of health that permit butchers and grocers to make outdoor displays of beef, mutton, fowls, vegetables and fruits, thus allowing them to become coated with such loathsome and dangerous filth?

Winds often carry disease. We have known typhoid fever to be borne by prevailing winds in a dry atmosphere from excrementitious matter of typhoid patients, thrown upon the ground, and to follow a track as clearly marked as when water-borne. Whether the germs were carried by the unaided breezes, or by flies whose flight was guided by the air currents, we do not know; the result was the same, though, if by the latter agency, good screens might have barred the dangers from the home.

Hot, dry winds, as the harmattan of the West African coast, are conducive to certain diseases, and the sirocco of Northern Africa and Southern Italy, whether dry or moist, has a depressing effect. So, too, the simoon of India and the hot winds of Australia are deleterious to both vegetable and animal life. Even in their milder form, as sometimes found on our western plains, they sap human energy and may be injurious.

In this latitude remittent fevers and diseases of the alimentary canal reach their acme during the heat of August, typhoid fever in September and October, diphtheria and croup in November, December and January, acute lung diseases in late winter and early spring, and consumption, well nigh perennial, reaches its climax in March.

Sudden changes tend to disease, but the human organism so readily adapts itself to new conditions as to soon become acclimated. While the sanitarian recognizes the influence of seasons and climates in the production of diseases, he attributes them more to other causes, of which the chief are infection, ignorance and neglect.

Carbureted Hydrogen. — In mines a carbureted hydrogen often accumulates which, though not serious to health, is dangerously explosive when mixed with air. Carbon dioxide is one of the products of such explosions, and is what is known as after-damp. It may also be present without an explosion, in such quantities as to asphyxiate as completely as though drowned in water, those exposed to its action. It is frequently found in pits and wells. No one should enter such places, if they have been long unvisited, without first letting down a lighted lamp or candle. If it be extinguished, gas is there, and must be removed by heat or some other means. As good a way as any is to slack lime in the pit or well, for the process creates a current by the generated heat, and the slacking lime absorbs gas, so that a double action is obtained.

Being heavier than air it may also be drawn out by a cord fastened to an inverted umbrella, much the same as drawing water with a bucket, repeating the process until on letting down a candle it continues to burn.

Carbon Monoxide is one of the most common and most dangerous gases with which we have to deal. It is the gas which escapes from stoves when their draught is defective, or when they are sufficiently heated to open the pores of the iron. It causes many deaths from the ignorant blowing out of gas lights, instead of properly turning off of the gas. Turning down gas to produce only a slight light is always dangerous, for a sudden draught may blow out the flame, and the gas will continue to escape. This gas often poisons the air about coke and charcoal ovens, smelting and gas-works, producing in the workmen general debility, and diseases of the respiratory organs. The poisoning from it causes headache, dizziness, roaring in the ears, weakness, vomiting, unconsciousness, convulsions, diminished heart and lung action, and complete asphyxia. At all works where injurious gases are generated every precaution should be taken to supply good air to the workmen.

Sewer Gas is a mixture of gases, vapors and solid particles, derived chiefly from organic matter in a state of decomposition. Carbon dioxide, sulphureted hydrogen, ammonia, etc., are usually present. The great danger lies in the germs which produce the decomposition of the particles of animal and vegetable matter. That sewer gas is itself capable of producing such diseases as scarlet, yellow, typhoid and malarial fevers, cholera, etc., is no longer believed, but gas from sewers containing excreta from patients laboring under these diseases, if connected with houses by improper plumbing, or defective traps, may contaminate food or water left near sinks or other openings, especially if, from disuse for a few days or weeks in hot weather, the pipes and accumulated matter within them become dry, in which case it may also be possible for germs to settle upon the lips of one breathing the gas and be carried in the saliva to the throat or digestive tract, the fields for their deadly work. It is certain, however, that gases as poisonous as those that escape from sewers will, if long inhaled, reduce the system to a susceptible condition for the easy contraction of these diseases, and it is probably in this way that most of the mischief is done. Wash basins and other conveniences with sewer connections should never be in living or sleeping rooms, no matter how perfect the plumbing. They are likely to be bad enough in the kitchen and bath room where they can be shut from the rest of the house and their dangers reduced by special ventilation.

Dust containing organic matter, not septic, often produces serious results. Workmen in tobacco factories usually suffer for a fortnight after commencing work, from catarrh, nausea, nervous troubles and loss of appetite. In pregnant women there is a tendency to abortion. The system soon accustoms itself to the action of the poison, though it often leaves a permanent impress upon the nerves, and an irregular action of the heart and lungs. The average life of the cigar maker is but 38 years. Millers, though often hearty and seemingly robust, frequently suffer from pulmonary diseases, and have an average life of but 46 years. Those operating grain elevators and threshing machines suffer from a very irritating dust which loads the pulmonary mucous membrane, often producing severe rigors after the first day's work; but in a short time the system becomes accustomed to it and suffers less.

We have known one season's work to destroy the lives of all those who spent much of their time in a dust saturated room, engaged in the manufacture of ochre brick by the dry process. Brush makers, from the inhalation of sharp fragments of bristles, are prone to lung diseases. Cotton-mill operatives, from breathing air laden with cotton fiber, suffer from various forms of bronchial and pulmonary trouble, frequently ending in consumption; while, because of the oil in wool, consumption among woollen-mill operatives is comparatively rare. Wool and rag sorters' disease is probably a form of anthrax, due to specific contamination, and its prevention lies in properly steaming the stock before giving it to the pickers. The lungs are stained by coal dust, just as the skin is stained when long kept in its solution. The lung tissues of an old coal miner are a bluish black, though the occupation rarely tends to pulmonary disease.

Inorganic Dusts often produce grave results. Among file cutters, 62.2 per cent contract phthisis; needle polishers, 69.6 per cent; grinders, 40.4 per cent, with an average life of 30.16 years. In grinding glass, cutting millstones, or any other occupation that fills the air with dust, there always is a tendency to serious lung disease, the danger being in proportion to the sharpness of the dust, and the quickness of its chemical action. Prevention lies in guarding against the admission of the dust to the air passages.

VENTILATION.

By ventilation we mean change of air by artificial methods, whereby that which is pure is made to displace that which has become impure. It is essential to the health of all who live in enclosed spaces, and is of special importance in homes continuously occupied. It is perfect when pure air, at an agreeable temperature with proper moisture, is distributed throughout an enclosure without perceptible draught, in such quantity as to prevent its occupants from inhaling that which has been exhaled or otherwise contaminated. When taken into the lungs, air is warmed, moistened and made lighter, so that when exhaled it rises, creates a current and gives place to fresh air. In this way nature provides that we shall be ventilated, and never permitted to breathe air which we have expired, if opportunity be given it to escape, but man, in his unwisdom, to economize fuel has applied every mechanic art to make the house tight, thus keeping in exhausted and contaminated air, and keeping out that which is pure and invigorating.

As the average adult breathes 540 cubic inches of air every minute, and in the same time throws out about 25 cubic inches of carbon dioxide which pollutes and makes unfit for breathing 5,000 times its volume of air, one can readily understand the importance of ventilation. To breathe an atmosphere from which the oxygen has been exhausted is to starve in the midst of plenty, while to breathe contaminated air is suicidal. When, upon entering an occupied room, a musty odor is noticed, and there is a sensation of faintness, you may feel sure that it contains a much larger proportion of carbon dioxide than the air without. Dr. Parks says: "Impurities may be detected in this way when there are 6 parts of carbon dioxide in 10,000, and when there are 10 parts the air is markedly close and unpleasant to those coming from a pure atmosphere."

Sanitarians generally agree that the standard of purity shall be about two parts of carbon dioxide in excess of that contained in what is called pure air, which we have already seen is about four parts in 10,000. Not only is the dioxide itself injurious, but, when due to respiration, is a danger signal because of the poisonous effete matter always associated with it. Ventilation must prevent it from being present in larger quantity than six or seven parts in 10,000. It may be detected by moistening a piece of blotting paper with aqua ammonia and placing it within a cylinder of the same paper moistened with dilute muriatic acid. If present in dangerous quantity there will be the white fumes of muriate of ammonia. The test should be made in the stratum that is being breathed and at the places of entrance and exit. If the above standard be accepted as the limit of impurity, about 750 cubic feet of air per hour must be distributed to each occupant of a room.

We should always consider the source from which air is received and guard against the admission of that already impure. Ground air and air contaminated by any kind of sewage or dust must be carefully avoided. The best air for ventilating purposes, especially in cities, is that taken from above contaminating influences, admitted through a shaft and forced downward by some fanning process. All buildings occupied by many people should be ventilated in this way. By using ice in hot weather, buildings thus equipped may be kept comfortably cool. In planning for ventilation we must consider the cubic space of the apartment, the number of inmates, how long they will occupy it, the rapidity with

which the air may be changed without dangerous draft, and the mode of heating and lighting. A room 25x30 feet, with a ceiling of 13½ feet, will contain 10,000 cubic feet. If occupied by 40 persons each would have an air space of 250 cubic feet but, if occupied continuously, each should have from 300 to 400 feet.

A school room, well ventilated and frequently flushed, occupied from six to eight hours daily, will be healthful with 240 cubic feet to each pupil. The average school room does not give half that. If the over-crowded apartment does not stupefy the brain of both pupil and teacher, and develop actual disease, it will devitalize until its occupants become easy victims to every type of disease, especially the septic ones; as scarlet fever, typhoid fever, diphtheria, measles, etc., the great destroyers of childhood and youth. Very great care should be taken in the ventilation of all rooms continuously occupied by many people, and this is especially true of the school room. Large numbers of children are often crowded into apartments entirely too small and their little lives jeopardized by teachers not well informed on ventilation and the dangers arising from breathing poisonous air.

To ventilate with cold air the entrance and exit should both be near the ceiling but on opposite sides of the room, that the pure, cold, heavy air descending may displace that which has become impure, warm and light, by crowding it through the exit. No one should sit under such an entrance, for a current of cold air falling upon the head is dangerous. This may be largely avoided by such an arrangement of slats as will give the current an upward turn. Dust may be kept out by stretching thin flannel over the openings. There should always be a current passing through the room.

Where windows must be used for ventilating and a large amount of air is not required, a good way is to fit a board, five or six inches in width and as long as the window is wide, to the under side of the lower sash so as to permit no air to pass under the window when raised but to admit a nice stream, with an upward turn, between the lower and upper sashes. Two or more windows on opposite sides, thus equipped, will do much toward keeping the air of an ordinary room pure and healthful.

Good ventilating shafts for houses to be warmed by stoves may be cheaply obtained by building the chimneys large, say 18 inches square inside, then running the stove-pipes up inside them

to their tops, but a better plan is to build a separate ventilating shaft close beside the smoke flue. In either arrangement two registers, one near the floor, the other near the ceiling, should open into the ventilating shaft from each room.

The heat from the stoves will create strong drafts in the shafts which will draw from the rooms opening into them. Open fireplaces or grates are excellent ventilators.

Air must be admitted from a pure source. Cellar air, so commonly supplied to furnaces, is always dangerous. Pathogenic germs rarely rise above the lower strata, hence air taken from above the roof is usually the most desirable. When this cannot be admitted, the opening to the shaft should be as far above the ground as practicable and, when heated, should not be carried into the rooms through the floor, where the registers are liable to become clogged and fouled by sweepings and other contaminations, but through walls near the floor, and discharged near the same level on the opposite sides. That it may be equally diffused throughout the room, without perceptible draft, it is better to have several points of entrance and exit. Unpleasant drafts may be corrected also by making the entrances larger than the exit but, in every form of ventilation, let it always be remembered that ample provision must be made for the removal of foul air.

The proper size for flues and registers can be found by dividing the number of cubic feet of air to be supplied per second by the velocity in feet, per second, of the air at the inlet. It is better to have the openings, both inlets and outlets, made too large, rather than too small, as their size can be more readily reduced than enlarged. The velocity should never exceed six feet per second, and if the registers are so placed that the admitted air strikes the occupants it should not exceed one and a half feet. The amount of air to be supplied will depend more upon the number of persons than upon the number of cubic feet the room contains, but a room warmed by hot air and equipped with proper exits will require more to keep it comfortable than is needed for respiration. The current may be stronger at the outlet than at the inlet without causing dangerous draft. If the shaft be built next to a warm chimney, the velocity will be increased.

Some novel modes of ventilation have been patented, which are even worse than the economy of corking every crack and crevice by which pure air may enter and foul air escape. Where

builders, especially school boards, are not thoroughly posted in scientific ventilation they should consult a disinterested expert, for no feature of the building is more important.

"Dry water closets" are rarely, if ever, satisfactory and should never be placed in either public or private houses. Sewage should never be permitted to accumulate in or about a building, and if dried or cremated it must be done where it cannot contaminate the air breathed by people, and every precaution should be used to prevent sewer gas and other noxious air from entering ventilating shafts, except as drawn from the rooms they ventilate.

Where there are no arrangements for improved methods of heating and ventilation, an equal diffusion of warmth and pure air may be secured by surrounding the stove with zinc sheeting, open at the top, with an air space of a foot between it and the stove. Pure air from outside the building must be admitted through a pipe terminating beneath the stove and after being diffused through the room, escape near the floor at the several sides into ventilating shafts.

In every school room, and in all rooms occupied for many hours by many people, there should be a few simple instruments. A thermometer should be placed four feet above the floor, and should register 68 degrees Fahrenheit. To know that warmth is equally diffused it should, from time to time, be placed in different parts of the room. An air tester, indicating the purity of the air, is even more important. Wolpert's is a good one and easily comprehended. A hygrometer, showing the percentage of moisture, is also useful. Danville's, Regnault's and Heddlestrom's are all good instruments.

The greater the amount of air, whether warmed before or after its admission, the greater the amount of fuel required. Ventilation and heating are interdependent. It is false economy to sacrifice the former to the latter, for, although there can be no cheap system, a perfect system is always worth more than it costs. If we can secure in the home and other buildings occupied by human beings an abundant use of pure air, we shall have done more toward preserving health and prolonging life than we could by the solution of any other sanitary problem. The lowered vitality, consequent upon imperfect ventilation, may be gradual, at first inappreciable, but it undermines the health, lessens the power to resist infectious and contagious diseases, and tends to premature

age and death. Its influence upon some may for a time be unperceived. The power of adaptation to environment, always great, varies greatly in different individuals, so that it is ever the old story: "And two women shall be grinding at the mill, the one shall be taken and the other left."

The causes of disease, physical as well as mental, rarely occur singly, and it may sometimes be difficult to say which is responsible, this or that. Scientific sanitation seeks not only to know all the causes of disease, but to remove them all, a consummation that never can be reached without the aid of ventilation and a constant and liberal supply of pure air.

CHAPTER V.

WATER.

We can live longer without water than without air, but as the body is from four to five sevenths water, from which, by excretion and exhalation, there is constant loss, a frequent renewal of the supply is essential to life. Water is the medium by which the nutrients and waste products of the body are held in solution or suspension, and borne to and from the various tissues and organs, and the diseases consequent upon an inadequate supply of it cover the entire list of those caused by innutrition and the non-removal of the waste incident to all activity. Nothing can atone for insufficient water.

It is very important that water for domestic purposes be pure. All organic matter, undergoing or liable to undergo decomposition, renders water impure, and although it may contain no specific form of sepsis producing cholera, yellow fever, typhoid fever, or the like, it gradually lowers vitality and systemic resistance, thus tending to the ready inception of all forms of disease. Some minerals in moderate amount are inert, or even healthful, while others in the smallest quantity are poisons. Absolutely pure water, H_2O , does not exist in nature. Lake Loka in Sweden is said to furnish the nearest approximation, and to contain but one twenty-eighth of a grain of solid matter per gallon. Decomposing algae and other water plants, and the leaves of most trees, are less dangerous than decaying animal matter, which is less dangerous than ordinary human excreta, and very much less dangerous than the discharges from patients laboring under certain diseases.

In all cities most homes are, and should be, provided with hydrant water, the purity of which is likely to be measured in each case by the degree of civilization possessed by the city, that civilization being highest which furnishes the purest and most abundant water. In densely peopled localities no wells should be tolerated, for in cities and most villages, old or recent privy pits and cesspools honeycomb the ground, while leaking sewers

and made soil are common, furnishing constant contamination and, often, a terrible death rate.

Country wells, properly made, are usually healthy, though we have seen fearful epidemics of typhoid fever and diphtheria in rural homes caused by wells being contaminated by privy pits and other foulness. It is a rule that the privy should be one hundred feet from the well. This is the minimum. When the soil is porous or the dip of the strata is from the privy toward the well, the distance should be very much greater. Always avoid the latter arrangement, if possible, by placing the privy on the lowest ground. Specific poisons, such as produce typhoid fever, yellow fever, Asiatic cholera, malignant dysentery, etc., in the smallest possible quantities, are dangerous, and all danger signals should be regarded.

The greed of gain characterizing too many water companies should not be allowed to hazard the lives of their patrons. The water supplies of cities taken from streams receiving city sewage, and distributed without proper sedimentation and filtration, may be condemned without analysis; and so may wells, although their water be clear and sparkling, pleasing to the palate and comparatively free from organic matter, if they be in the neighborhood of privy pits, or allied sources of pollution, especially if any water-borne disease has followed their use. Taste and appearances may be very unreliable guides.

SEDIMENTATION.

Sedimentation means permitting water to stand in basins until its heavy inorganic matter falls to the bottom, carrying with it a portion of the organic contents, while the remainder are more or less perfectly disintegrated by the action of microbes. The agency most relied upon for purifying water is filtration, but supplies containing much solid matter in suspension must first be treated by sedimentation. In this process, properly conducted, the water is drawn from one basin to another until it is clear, the number and size of the basins being regulated by the impurity of the water and the amount required. An acre in extent is a convenient size. The basins at St. Louis emphasize their importance. They each hold 18,000,000 gallons of water, and the sediment, removed every four months, amounts to 2,000,000 cubic yards per annum. To all water containing large quantities of finely powdered soil, a week should be given for sedimentation.

FILTRATION.

Filtration is the passage of water through some substance that removes from it the solid particles. The bacteriologist contends that, to be of any value, filtration must also deprive it of its bacteria. Pursuant to this the following points were so clearly made by Prof. J. B. Johnson, of Washington University, in an address before a recent meeting held by our State Board of Health, that we quote by permission:

"In general, there are but two sources of water for domestic use—surface waters and ground waters. Since all surface waters, whether rivers or lakes, are composed of the run-off, they must contain the impurities washed from the surface by the cleansing rains. These are carried either in solution or suspension, and, along with the inert organic or inorganic matter, there will always be found in every swallow of water some millions of bacterial organisms. As most of these are entirely harmless, we suffer no detriment, but occasionally they include some of the disease-producing bacilli, and then, if the system is in a susceptible condition, sickness results. If in close communication with surface drainage, ground water is likely to be as fully contaminated as surface water, and often it is very much worse."

"It is only from deep wells, wholly cut off from surface contamination, that water can be obtained absolutely free from bacterial life. Such a supply is that of Memphis, Tenn., where the water comes from a large deposit of pure quartz sand several hundred feet below the surface, from which it is separated by a thick stratum of clay. While artesian waters are likely to be charged with inorganic matter in solution, they are quite free from all organic pollution and from all forms of bacterial life; but since these sources are very exceptional, few cities can be supplied in this way, and the chief reliance must be upon surface waters. These, to be entirely healthy, must be freed from their bacteria. One of the greatest triumphs of sanitary science is the ability to do this, and it can be proved beyond a reasonable doubt that this purification is effected by filtration through fine sand."

"Evidently this process does not consist of straining the water, for these organisms pass rapidly through the closest filter paper, and probably wherever water can go, so far as any mechanical restriction is concerned. The action of a sand filter is something very different. Indeed, the efficiency of a sand filter

depends upon the presence in the water of certain microscopic vegetable growths, which are collected on the sand grains on and near the top of the filter and there form a kind of porous blanket-covering, through which the water to be filtered must pass. This gelatinous cover is of a thick, spongy nature, and is itself a growing vegetable, furnishing enticing habitations for the innumerable families of water bacteria which here find a home. These in turn attack and consume the organic matter in the water as it slowly moves down through this superficial blanket of living and hungry organisms, so that, after passing through this film, not over a quarter of an inch thick, the water is found to have lost not only its bacteria but a very large portion of its other organic matter."

"All surface waters contain a sufficient number of vegetable spores to form a protecting coat in a few days, after which it is constantly renewed from the oncoming water. As the vegetable which forms the tough coating, and the all-consuming bacteria housed therein, die, they are at once consumed by the living generation, which is ever increasing in numbers, until the passages between the sand grains become clogged with them, when this impervious purifying cover has to be removed and a new one allowed to form. In water containing a large amount of silt, like that of the Missouri river, which must first be settled to get rid of the mud to prevent immediate clogging of the sand filter, we find that a large proportion of the organisms which form the spongy cover, and also of the all-consuming bacteria, go down with the mud in the settling basins, and that it is likely to require a longer time and the passage of a larger quantity of such settled water through the filter to render it again effective, after a cleansing by removal of its top layer, than it does of water that was originally clear."

It is thus seen that water, alive with micro-organisms, contains within itself the elements for its own purification, and that the sand filter furnishes the means for making them effective. The process is a bacteriological, not a chemical one. Water may be chemically pure, yet contain so many disease germs as to be very dangerous. Upon no scientific subject has there been a greater change of views during the last few years than that of water purification. It has been but a little while since animal charcoal and some other forms of carbon were thought ideal materials for filters, because when fresh and in perfect condition

they can strain out some colors from swamp waters and change claret into a colorless liquid, but it is now known that they can remove scarcely anything of a disease-producing nature, and are unable to promote any germicidal effects; that asbestos filters are also worthless, and that very little confidence can be placed in any filter made from natural stone until that particular filter has been tested. At that time sand filters were thought of no value, because they remove but a small proportion of dissolved inorganic matter. Indeed, it was not until after the discovery of bacteria in water, and their relation to disease, that the real significance of water filtration began to be understood.

Although a sand filter may strain out solids and make water clear, its most valuable service is that of destroying disease-producing bacteria by means of other bacteria, as already described. To do this most efficiently the filter must have been in operation several days, not only that the sand may become firmly settled, but that the slimy, vegetable growth, swarming with bacterial life, may form over its surface. Let it be emphasized that it is in this covering that its chief value lies; that here the principal purification of the water takes place; and that when this film has been formed it will do good work until it and a thin layer of sand next to it have become so clogged as to cause too scanty flow, when a thin layer must be scraped from the top of the filter-bed and a new film allowed to form. At some large filters it is customary, as soon as the clogged layer has been removed, to spread over the surface some of the sand scraped off at a previous cleaning, that its bacteria may hasten the growth of the new covering, and the period that the filter must remain idle thus be shortened. Meantime, the outlet is closed, and the surface of the filter-bed is kept covered with filtered water let in from below.

Most of the purifying organisms require oxygen, hence, the use of the filter should be discontinued for an hour or two each day, the water drawn off, and the surface of the bed exposed to the air. With long use a gradual growth of the surface bacteria extends through the filter-bed, and so large a number of these organisms then appear in the filtered water as to make it necessary to renew all the sand.

Although nearly all water bacteria are harmless to the human body, and many of the common, vigorous forms rapidly destroy disease bacteria, such as the germs of typhoid fever, when brought

into contact with them, water that contains more than 100 of any kind of germs to the cubic centimeter (fifteen drops) is considered unfit for use. When it is remembered that a filtrate of this degree of purity is likely to have contained many thousands of bacteria per cubic centimeter when it entered the filter, it can be readily understood that the modern sand filter, properly controlled, silently but surely performs a most priceless service.

As already indicated, it is impracticable, if not impossible, to make a filter with spaces between its grains smaller than the microbes. The medium sought is one with spaces so small that the microbes shall be retained by molecular attraction until they can attack and destroy each other. Sands of various dimensions are used for this, but in general its grains should not exceed .015 of an inch in diameter, and a smaller size is usually preferred. With everything in perfect order, a filter-bed of such sand a few inches in thickness is sufficient, but to guard against accidents and to assure reliable service for a long time, the large filter-beds, used in the purification of water supplies for cities, are usually composed of from 30 to 60 inches of fine sand, resting upon a few inches of coarse sand, underlaid by a few inches of fine gravel, with a layer of coarse gravel under all, that the filtered water may readily percolate through it to the outlet.*

For effective bacterial work, filtration must be a slow process, and the efficiency of a filter will vary inversely with the quantity passed through it in a given time. To secure good results, the speed of the water as it passes through the fine sand should not exceed four inches per hour, under a pressure of three or four feet of water.

The prevention of water-borne diseases by proper filtration has been so thoroughly demonstrated, we will pause to mention only one of very many convincing tests. Hamburg and Altona, in Germany, lie closely, side by side, on the right bank of the Elbe, and both take their water-supplies from that stream—Altona from a point seven miles below the sewers of both cities, Hamburg from about seven miles above. The raw water of Altona is thus polluted with the sewage of about 770,000 people,

* Recent experiments with water excessively charged with bacteria indicate that deep filter-beds may sometimes be necessary, and emphasize the importance of sand action in germ destruction, as distinguished from the action of the sediment layer, by which it appears that while the surface film is the principal factor, it is not by any means the only agency in sand filtration.

and generally contains from 20,000 to 40,000, sometimes 100,000, bacteria per cubic centimeter. The Hamburg supply, prior to 1893, received no filtration, but that of Altona was purified by sand filters before delivery for domestic use.

In August, 1892, some gypsies, among whom was a case of cholera, camped on the bank of the river, above these cities. An epidemic of the disease promptly broke out in Hamburg, causing in August and September 16,748 cases and 8,605 deaths. No cases occurred in Altona until December and January, when a slight epidemic came, caused, as Professor Koch afterward demonstrated, by contaminated water that had passed through cracks in the walls of the filter-beds, results of freezing. Although along a street forming the dividing line of the two cities, there were numerous cases on the Hamburg side in August and September, on the opposite side, among the residents supplied with the Altona filtered water, not a case of cholera occurred. In like manner, because of the freezing of its filter-beds, Altona suffered from typhoid fever during other winters, and, although the fever was constant in Hamburg, it appeared only at these times in Altona. But Hamburg still further illustrates the value of pure water. Roused by its cholera scourge, the city adopted most radical improvements, whereby its water supply, which is still taken from the same polluted stream, was so filtered that its death rate from typhoid fever, which had always been very large, has been reduced to only 6 in each 100,000 inhabitants.

Filter galleries are trenches sunk below low water mark, extending several feet to a reservoir, and filled with sand and gravel. They are very unreliable and likely to prove a source of danger and disappointment.

Filtration by percolation is one of nature's chief methods of purifying water, and is more or less perfect, according to the medium through which the water passes. When perfect, all suspended matter, alive or dead, is intercepted.

OTHER METHODS OF PURIFYING WATER.

Nitrification, oxidation, sunlight, heat and cold are also nature's methods.

Nitrification is a sequent of germ action, which, as we have seen, plays such an important part in the purification of water by sand filtration as to constitute its main factor.

Oxidation is the action of atmospheric oxygen. Its power to change organic matter has been greatly overestimated. No river is long enough to purify its water in this way. Even the waters of Niagara are little changed by their tremendous leap through the air.

Sunlight destroys many kinds of germs, and in this way is a purifier.

Heat, as produced in nature, has little influence in purification. Results sometimes attributed to it and to oxygen are due to light.

Cold cannot be relied upon to destroy many kinds of bacteria, or as a means of purification, although alternate freezing and thawing will diminish organic life, and cold hastens sedimentation. Ice may be very impure and is a frequent means of conveying disease. Water will not "freeze pure." Many micro-organisms are not injured at all by freezing, but on thawing out awake to new activity, and, if taken into the alimentary canal, are liable to do deadly work.

Distillation produces pure water, and though its expense precludes its use on a large scale, there are small stills in the market capable of furnishing supplies for family use without much extra expenditure for fuel. (See Beverages, page 82.)

Boiling is an easy method of destroying germs, thus rendering inert organic matter. All suspected water should be boiled twenty minutes before it is used for drink. The insipidity of boiled and distilled waters may be overcome by pouring several times through a pure atmosphere or by other means of aeration. Filtering through charcoal improves the taste.

DOMESTIC FILTERS.

A good domestic filter is needed in most households supplied with either rain or hydrant water. Most of those on the market require constant care and intelligent supervision, and nearly all of them have no bacteriological value, hence, are practically worthless. A better one than most of those offered for sale can be made by placing a piece of thick, white flannel in the bottom of a large flower-pot, previously cleansed by scalding, placing on that a couple inches of fine gravel, on that a thin layer of coarse sand, then six or eight inches of fine sand over all, and well pressed

down. To be of any value it must operate slowly. A fruit jar, or large bottle, with a funnel in its mouth, makes a good receiver for the filtered water.

RAIN WATER.

Rain water includes all water that has been evaporated, condensed and precipitated, whether as rain, snow, frost or dew. By many it is thought to be pure. But it is often very impure, for in passing through the air it absorbs gases, especially carbon dioxide and ammonia, and brings down with it various atoms, always floating in the air. As these atoms are chiefly organic, rain water containing three grains of solid matter per gallon is considered impure, although that amount in spring or well water might not be injurious.

In cities, roofs are often covered with dust, containing a large amount of organic matter, and water collected from them may be very bad. A pure supply may be obtained by turning off the first rain-fall and passing the rest through a good filter. It is as difficult to obtain perfection in filters as in many other things, but a properly constructed sand filter, more nearly, perhaps, than any other, fills all the requirements for purifying rain water before it enters the cistern.

A brick and cement, water-tight reservoir, five feet in diameter (or as much larger as the size of the roof and cistern may demand) and about ten feet deep, should be constructed. A vitrified pipe should form the outlet, and over its opening at the bottom of the filter should be placed pieces of brick or stone, to prevent the entrance of gravel. A six-inch layer of coarse gravel should then be spread over the bottom, over this a four-inch layer of fine gravel, next four inches of coarse sand, then about forty-eight inches of fine sand. A few bricks may be placed below the supply pipe to prevent the incoming water from tearing up the filter-bed. The remaining space will form a reservoir for storing the water gathered during a shower, until it can pass down through the sand. The more slowly this process is performed, the more efficient it is apt to be. Water will be less likely to pass down between the sand and the wall, thus escaping filtration, if there be built in the wall, about thirty inches from the bottom, a horizontal offset four or more inches wide, abruptly increasing the diameter, for the sand will pack more closely upon this horizontal surface than upon the vertical ones.

Of course, the materials used must all be clean. It is not best to heat the sand, but if dirty it should be thoroughly washed before it is placed in the filter. When the surface of the fine sand becomes clogged, a thin layer should be scraped off, and replaced by clean sand. After a time the entire filter-bed must be taken out, and one made of fresh materials substituted. As much of the reservoir should be below the surface of the ground as the depth of the cistern into which it is to drain will permit. The top is best left open to the air and light, but, during winter, a few boards may be laid across, and the top and sides protected from frost by a covering of straw or similar material. If the filter-bed becomes frozen, water should not be admitted until the frost has thawed out.

The cistern must be so constructed that no seepage can penetrate its walls and no vermin enter from the top. The surface should slope from it in every direction. If made of brick or stone, though laid in cement, it should be at a safe distance from all cess and privy pits. The best material for it is iron, laid in sections with cement, and coated with tar. Probably the next best material is vitrified brick, laid in cement. The cover should exclude all contamination, and be equipped with a ventilator to admit pure air. No lead, zinc or galvanized pipes should be used about it. The pump should not rest upon the bottom, but terminate a few inches above it, suspended from the platform. The chain-pump rigged with small buckets which carry air down into the water every time that water is brought up, is the best yet devised for cistern use.

Pure soft water is healthier than hard water, and is better for cleansing purposes, giving a fresher and more youthful appearance to the complexion and greater softness to the skin, but it dissolves both organic and inorganic matter more readily, hence, increased care is required to preserve its purity.

TESTS FOR IMPURITIES.

Only bacteriological tests conducted with great skill and care can certainly decide as to whether water contains disease germs, and in some cases careful chemical analysis is required to detect the presence of injurious inorganic elements, but there are several tests for impurities, so simple as to be made by anyone. In all examinations remember that the purity of the water in a well

or reservoir differs at different depths. The surface may be practically pure, while, from sedimentation, there is great impurity at the bottom.

Color.—Pure water, in a clean and clear glass bottle, when light shines through it on a dark background, will be clear and colorless. A faint blue tint is no evidence, however, of impurity, but a yellow tint is always suspicious.

Odor.—Fill a bottle half full of the suspected water, cork and place it where it will keep warm a few hours, after which shake it and remove the cork. If it emits any odor, especially an unpleasant one, the water should be further tested.

Taste.—Water fresh from the well is usually tasteless, although it may contain putrescible matter. If pure, it should remain tasteless after it has been left in a warm place long enough for any organic matter it may contain to decompose. If any unpleasant taste develops, the water should be subjected to analysis.

Fermentation.—Into a clean glass bottle, filled with the suspected water, drop a pinch of pure white sugar, and put it in a warm place, leaving it uncorked. If in two days the water appears cloudy, it is impure and unfit for use.

The Permanganate Test.—An excellent test may be made by putting into a glass-stoppered bottle two tablespoonfuls of water, three grains of permanganate of potash, and twelve grains of caustic potash. When the potash has been dissolved, add a drop of the liquid to eight tablespoonfuls of the water to be tested, in a clear white bottle, and if the color changes to a brown, or in a few hours disappears, the water is too impure for drinking. In all tests be careful that everything used, except the water, shall be strictly clean.

BATHING.

Water must also be used for other than potable purposes. Cleanliness is next to godliness, because it tends to health, happiness and purity. This requires abundant water in every home, and its free use by every individual. So marvelous have been the results of cleanliness, through the free use of pure water, that in surgery they led at first to erroneous conclusions. Scientists believed the benefits were due to some specific germicide, and operating rooms were therefore flooded with solutions of carbolic

acid, corrosive sublimate, and the like. Under the leadership of Lawson Tait, it was found that the rapid and healthy healings without inflammation or pus were due to thorough cleanliness, secured as readily by aseptic water as by the use of drugs. What is true of the prevention of disease in wounds, is true of its prevention everywhere. If the body, within and without, and all its surroundings, be kept pure, disease will be reduced to the minimum.

The skin encasing the body performs many important functions. It is the most extensive membrane of the organism, and not only covers the body, but is reflexed, and lines all the cavities which open on its surface; for although this inner lining is called mucous membrane, it is only skin turned in. The skin not only forms a covering and protection, but, through a delicate network of nerves, furnishes information as to the character of its surroundings. The hardened cells of its outer covering are continually loosening, and, if not removed as dead organic matter, will decompose and perhaps be absorbed, for the skin not only absorbs oxygen, but the excretions of the body and other deleterious matter that remains in contact with it. Hence, we must wash and be clean.

We note progress in many lines of sanitary science, but in water supply we are behind the civilization of ancient Rome, which led the ages. Pure water brought from far-away mountains by its great aqueduct, literally flooded the city of seven hills, and its people understood its importance and use. Agrippa erected 177 elegant baths, where the poorest Roman could lave without a farthing, and provided yet more luxurious ones at the charge of a penny, thus tempting to cleanliness every citizen. Rome had 856 public baths, receiving 400,000,000 gallons pure soft water annually, and, as a corollary of this munificence, private wealth competed in the construction of baths, of splendor almost beyond modern conception, with another yet more important consequent;—Pliny tells us that for six hundred years Rome needed no other medicine than her baths. She boasted then in the health and strength of her people. Her degeneration now finds a fitting sequent in the filthy, dwarfed and ungainly Italian immigrants that crowd the huts of our mining camps and cities.

Would there were Agrippas in the great Christian cities of the modern world. While we are doing much to ameliorate the

condition of those struggling in life's unequal contest, there is everywhere failure to appreciate the importance of preventive medicine, especially in the supply and use of pure water. But the light is breaking slowly, and civilized nations are beginning to awake. In every first-class hotel, in many private houses, and in some tenements, there are approved bathing apartments, and public baths are scattered through most cities, but the price of the luxury is still generally beyond the reach of the poor, and too many brownstone fronts have baths for the family and guests, but deny them to those who cook the food, serve at the tables and care for the children.

The rain bath meets all requirements for a public bath, and has much to recommend it. It requires a minimum amount of water and serves it to each bather fresh and pure, warm or cold; it occupies little space, is easily kept clean, and may be used in all weather at all seasons. The falling water should break into spray with just sufficient force to rapidly cleanse the body. Whether warm or cold, or both alternately, it produces grateful sensations, and, as it runs away, carries with it the impurities from the person.

The necessary outlay for such baths is so small they should be supplied to every citizen at public cost. Any large establishment using steam can have them at little expense, where the workmen can quickly wash away the dirt and sweat, incident to their toil, and with such renewal of vigor that, on resuming work, they will return their employer more than a quid pro quo. Such bath houses should have a dozen or more rooms, each 6x8 feet, and high enough for proper water-fall. There should be both cold and warm water, admitted through easily managed faucets, the floor should be of stone, slightly sloping, and adjoining each room should be a small dressing room provided with hooks, towels, brushes, soap, etc. As these rooms practically clean themselves, they require little supervision.

Free public baths of this kind should be in every city, different buildings for each sex, and located at convenient points. While their establishment opens a wide field for private charity, it should not be left for individual philanthropy, but be done at public expense at all centers of population. Their prevention of disease, and the vigor and energy developed in the citizen, will abundantly repay the outlay. That some of our cities are beginning to move in this matter is one of the hopeful signs of the times.

Any house can have, at small expense, a satisfactory shower bath. All that is needed is a tub in which to stand and a tin pail with straight sides, a perforated bottom and an air-tight cover soldered to its top, with a nozzle for receiving a cork. Fill the pail with water, hang it over your head and, by pulling a string attached to the cork, admit air above the water. Use care that the shower shall not be cold enough to produce a shock.

The home of everyone who can afford it should contain a bathroom, so equipped that its use will be a luxury. Its windows should open into the outdoor air, its ventilation and plumbing be as perfect as possible, and its supply of water soft and pure.

THINGS TO BE REMEMBERED ABOUT THE BATH.

The bath should never be taken within two hours after a full meal, or when you are very tired, greatly exhausted, or chilly. The reaction will be the most perfect in the morning, but only a strong, healthy person should indulge in either a shower or tub-bath before breakfast. For early morning, the sponge bath is preferable. The temperature should be regulated by individual vigor and sensibility to that which is the most agreeable. Neither water nor air should produce chilliness, nor should the water be very hot. If there are chilly sensations, the bath should be very brief.

Those suffering from lesions of internal organs, especially of the heart or lungs, should avoid cold baths, or gradually educate themselves to their use. Aged people should always avoid them. Cold baths should not be taken during menstruation, but warm baths may then be beneficial, both by promoting cleanliness and by stimulating the discharges. A bath should never be continued until it enervates, or interferes with reaction. The average length of a warm bath should be from a quarter to a half hour, that of a cool bath less, that of a cold one much less. Never drink freely of cold water just before a bath, and always rub after a bath until both dry and warm. In healthy persons reaction may be hastened and a pleasant glow of warmth secured by a spray of cold water, showered over the body after the bath and followed by free friction with coarse towels. Violent exercise immediately after a bath is not desirable, but the vigorous may be benefited by a brisk walk, or other movements, to quicken the circulation and restore a normal temperature. The whole body should be bathed every day, or at least two or three times a week.

A little baking soda, ammonia or good soap added to the bath makes it more refreshing, since by cutting the oil and other excretions, it leads to a more thorough cleansing of the skin. Baths of milk, koumiss, beer, wine and blood have all had their advocates, but the best authorities agree that none are better than those composed of water. The special benefits derived from ocean baths, mineral baths, etc., may be due in part to the stimulus of their salts and minerals, but their chief value is in the outing which their use implies. The change in diet and surroundings, the rest of body and mind, the cheerful and healthful environment, and the hygienic effects of any kind of water properly used, are the important factors.

The "dry bath," a bath without water, is an approved method of stimulating the peripheral circulation, hence, of removing remora and recent congestions, and consists of free friction over the whole body, as by a dry towel, continued until the skin feels like polished ivory. It is a logical and generally successful method of equalizing the circulation and removing colds.

Vapor or steam baths are often very useful, for by promoting perspiration and other excretions, they cleanse the whole system. Various devices and costly cabinets are offered the public, but, for most practical purposes, the following contrivance is as good as any of them: On two slats support a basin of water just below the seat of a cane-bottomed chair, and beneath the basin place a lighted lamp (an alcohol lamp is best), then sit in the chair, cover yourself, chair and all, with a large blanket, gathering it tightly about the throat and letting its lower edge rest upon the floor. When steamed to your fancy, spray the body with cold water, rub thoroughly with dry towels, dress warmly and avoid draughts and other means of taking cold.

Swimming combines a general bath with vigorous exercise, and, therefore, may be continued longer than would be safe in water of the same temperature in a tub. Under proper conditions it is healthful and invigorating, but it should not be overdone. Young people, especially, are inclined to remain in the water too long. Unless the water is very warm, the stay should not be over twenty minutes, even for the most vigorous. Entering the water when exhausted by severe exercise is likely to cause congestion, and is very dangerous, but heating the body by outside influences, such as hot air, is good preparation for a bath, and promotes healthy reaction at its termination.

CHAPTER VI.

DIET.

By LOUIS C. DUNCAN, M.D.

Foods serve the human body in two ways, one of which is the replacement of the worn-out tissues. This might, at first, seem their only use, but another service, equally important, is the furnishing of heat and force—keeping the body warm and giving it strength. Before an engine can furnish power, fuel must be consumed and heat transformed to force; and before the body can have energy, food must be consumed, resulting in a similar production of heat and force. The first named service, by replacing worn-out parts, enables the body to perpetuate itself; the second, by furnishing power, gives it strength to meet the various demands thrust upon it.

These two requirements are met by two classes of foods:—The nitrogenous, and the non-nitrogenous.

The Nitrogenous Foods, so called because they contain nitrogen, meet the first demand—that of replacing worn-out tissues and building up the body. They are also known as albuminous foods and as proteids, the latter being their most common name. Lean meats, eggs, casein of milk, and gluten of grains, are of this class.

The Non-nitrogenous Foods, those which contain little, if any, nitrogen, meet the second demand, and are of two kinds—the fats, including the oils, and the starches, including the sugars. The principal non-nitrogenous foods are the grains, flour, meal, vegetables, rice, fruit, cream, butter, fat, meat and oils. They produce animal heat and energy, and may be stored up in the tissues as superfluous fat. The starches and sugars are often called carbo-hydrates.

The above classification must not be taken as absolute and exact. When speaking of a class of foods as “force producers,” we do not mean that they may not also be of some use in the economy of repair, but that their chief function is the production of force. So, too, the tissue-building foods may also bear a small

part in the production of heat and energy. Most, if not all, foods contain both proteid and non-nitrogenous elements, their percentages differing widely. Thus, the proportion of these parts in beef, milk and wheat are as follows:—

	Water and Minerals.	Proteids.	Non-Nitrogenous Elements.
Beef	57.00	27.60	15.30
Milk	87.52	4.48	8.00
Wheat	15.60	14.60	59.58

From the foregoing it will be seen that a mixed diet is a necessity, because the body demands both nitrogenous and non-nitrogenous food, and a little study of the above table will show that in general there is nothing to be gained by adhering to a vegetable diet. Though in varying proportions, the great staples, wheat, milk and beef, all contain the same elements. Thus, beef contains twice as much of the proteids as there is in wheat, but only about one-fourth as much non-nitrogenous matter (starch). Now, as baked bread contains a little less than half as much of the proteids as there is in an equal weight of wheat, if we eat bread alone we must take four times as much of it as we would of beef to get an equal quantity of proteids, and in so doing would overload the stomach with starch, getting about eight times as much as we would in eating the beef; but, by eating beef only, we would have to take an excess of proteids in order to get enough starch. Hence, we see that either bread or beef, as an exclusive diet, is likely to do harm by overloading and deranging the digestive system with one food element if we would get enough of the other. A judicious mixture of the two classes of foods will most economically secure the proper development of the body, and maintain good health and the maximum energy.

As the starches and fats produce heat, it is evident that they should not be taken in fevers, but that the proteids, which restore and maintain the tissues without evolving much heat, will then be indicated. The proteids, since they contain nutriment in more concentrated form, and, in general, are more easily digested, are best in nearly all kinds of sickness. On the other hand, a healthy body in cold weather will require fats and starches. Except in a few conditions, the fats are more easily digested and assimilated than the starches.

The Inorganic Foods.—Besides the two great classes of foods just mentioned, there is another class, known as inorganic foods. It consists of water and the various salts, and, although, strictly speaking, these substances are not foods, they, nevertheless, fill very important places in the human diet. As it is water that gives to the blood, serum, sweat, and other fluids of the body their fluidity, and constitutes 76 per cent of the muscular tissues, and is the common carrier which bears the nutrients to and the waste from the various parts, the reasons readily appear why it is so indispensable to animal life.

The salts pass into the blood, unchanged, hence it is only necessary that they be in a state of solution to be absorbed when they come in contact with the lining of the alimentary canal. Many of them are already held in solution in the water we drink, but an additional amount is usually needed and is added to the food to render it palatable. The chief of them is common salt (Na Cl), and is a varying quantity. It does five things for us and our food:—It renders it more palatable; lessens putrefaction; stimulates the flow of some of the gastric juices; by its affinity for water promotes the flow of it into the intestinal canal, thus assisting in the liquefaction of the foods; and, lastly, promotes osmosis, i. e., the mucous membrane lining the stomach and intestines permits a more complete and rapid passage through it of the liquefied foods, for being covered with a salty fluid. It is essential that food for the sick, as well as for the healthy, be properly salted. Certain minerals, as magnesia and lime, assist in the building process, and other articles besides salt, as acids, alcoholics and spices, are taken to stimulate the appetite, to render the food more palatable, or to aid digestion, but cannot themselves be properly called foods.

BEVERAGES.

Milk.—Of all beverages, milk is the best. Besides satisfying thirst, it furnishes the body with real nutriment to the amount of about 13 per cent of its bulk.

Water.—Water, of course, is one of the best of drinks. Pure water simply quenches thirst, but absolutely pure water is never found in nature, and, as already seen, the various wholesome salts usually held in solution in water serve a good purpose. Hence, water purified by proper filtration, or by boiling, is likely to be better than distilled water for drinking purposes. Indeed, unless

it contains poisonous solutions, or wholesome salts in excess, drinking water should not be distilled, for distillation impairs the taste and removes the salts and minerals essential to health. The various mineral waters are useful in many cases, but we have not space for their discussion.

Coffee and Tea.—Though in almost universal use, coffee and tea are not at all necessary to health and strength. The highest mental and physical efforts are possible with no other beverage than water. Coffee and tea contain very little nourishment, but, because of their stimulating effects, are very useful to soldiers and others undergoing great fatigue. After a day of severe physical effort without food, there is nothing else as grateful as good strong coffee. It is slightly laxative, while tea is astringent. The habitual coffee drinker suffers from headaches when without it, but soon becomes accustomed to the loss. It is claimed that strong coffee in the morning keeps off malaria; in the evening it often keeps off sleep. Strong, black coffee is an antidote to opium poisoning. It may safely be said that coffee and tea, of moderate strength and quantity, are not injurious, and may be beneficial by quieting the nervousness and mental unrest of fatigue and anxiety. Persons traveling, or in any way subject to great exposure and strain, should drink plenty of good coffee, but no alcoholics. Soldiers of the United States army, on travel rations, are allowed twenty-one cents each per day for coffee.

Cocoa and Chocolate.—Cocoa contains much nutritious matter of an oily nature, somewhat difficult to digest, and, as much boiling separates its elements and makes them still harder to digest, it should never be allowed to boil longer than five minutes. Chocolate should never be allowed to boil at all. In cases of consumption and other wasting diseases, either is an excellent drink, and when possible should be included in the diet.

Beer, Ale and Porter.—These are fermented liquors made from malted grains, and contain from 2 to 6 per cent of alcohol. The mildest of all the alcoholics, a moderate amount of them may be taken daily without injury, unless a morbid desire be created by their use. They have very little nutritive value, but increase the appetite, and favor the formation of fat. In large quantities they cause fatty degeneration of the organs, especially of the liver and heart. The fat of the beer drinker is not a healthy fat, and does not represent stored-up vitality. These drinks are

not prescribed in acute diseases, but are useful in convalescence, and in chronic wasting diseases; as consumption, protracted suppuration, long continued nursing, scrofula and diseases of the joints.

Wines.—Wines are made by fermenting the juice of the grape, and contain from 5 to 25 per cent of alcohol. Some wines, as Port, have alcohol, added during the process of manufacture; some such “fortified” wines containing as much as 30 or 40 per cent. Wines usually contain from 3 to 25 per cent of sugar, but dry wines are free from sugar. Foreign wines are in no way superior to our native wines. A glass of either, taken during the course of a meal, often aids digestion. Wines do good in diarrhea and dysentery, anemia and chlorosis, convalescence and chronic wasting diseases; in various acute diseases and conditions, with great weakness and feeble heart, they are highly useful. Such occasions are met in pneumonia, pleurisy, typhoid and other fevers, profuse hemorrhage, severe injuries and surgical operations.

Brandy and Whisky.—These liquors are distilled from the juices of fruits and grains. Brandy contains from 40 to 47 per cent alcohol, and whisky, from 45 to 50 per cent. Neither is suitable for a beverage, but both are useful in diseases and injuries. They may be used in cases where wine is useful, but something stronger is required. They are indicated in all chronic, wasting diseases, and are prompt antidotes to the poisoning of aconite, digitalis, conium, and the bites of poisonous serpents, but, to be of value in any of these cases, must not be given to intoxication. As soon as that point is reached, they should be discontinued, to be renewed as soon as the intoxication has disappeared, and the process is thus to be continued until the poison has been overcome.

It cannot be denied that the employment of alcoholics of any kind is accompanied by danger of the patient's becoming addicted to their use. This objection, therefore, should always be considered, and, except to elderly people, or in cases of great need, they should be administered very sparingly, if at all, and for a brief time only.

THE DIET IN HEALTH.

A quart of milk, three-fourths of a pound of good beef, and five ounces of wheat flour, severally contain about the same

amount of nutritive material. Milk contains every element needed by the human body, and comes nearest to being a perfect food. The quantity needed as a complete diet for an adult is about one and a half gallons per day. Wheat bread also contains all the necessary ingredients, and though not in the proper proportions, when taken alone will sustain life. Although it would be an imperfect diet, a man could live on beef alone, but beef and wheat bread together make the essentials of a perfect diet—form its foundation and body, all other parts being but additions and adornments to give variety, stimulate the appetite, etc. A study of the composition of these two great staples of diet logically leads to this conclusion, and all experience confirms it.

The amount of food daily required in health, and the proper proportion of its nitrogenous and non-nitrogenous parts, have been made the subject of much investigation. The tables of Professor Voight of Munich are generally accepted by scientific men. They show the following as the proper average amount per day:—

	Proteids.	Fats.	Starches and Sugars.	Total.
Man with light exercise.....	.22 lbs.	.22 lbs.	.88 lbs.	1.32 lbs.
Man with moderate labor.....	.28 "	.28 "	.98 "	1.54 "
Man with hard labor. ....	.33 "	.33 "	1.10 "	1.76 "

COMPOSITION OF FOOD MATERIALS.

Showing proportions of waste, water and nutritive parts.

Food.	Waste.	Water.	Nutritive Material.
Beef—Neck	20.	49.6	30.4
Shoulder	12.6	55.8	31.6
Chuck-rib	14.6	49.5	35.9
Rib	21.	38.2	40.8
Sirloin	19.5	48.3	32.2
Round	7.8	60.9	31.3
Side	19.2	44.3	36.5
Rump (corned)	5.	70.8	24.2
Flank (corned)	12.1	43.7	44.2
Veal—Shoulder	17.9	56.7	25.4
Mutton—Shoulder	16.3	49.	34.7
Leg	18.1	50.6	31.3
Loin	15.8	41.5	42.7
Side	17.3	44.2	38.5
Pork—Fresh	14.6	43.	42.4
Salt Ham	11.4	36.8	51.8
Chicken	38.2	44.6	17.2

Food.	Waste.	Water.	Nutritive Material.
Turkey	32.4	44.7	22.9
Eggs	13.7	63.1	23.2
Bluefish (dressed)	45.9	43.	11.1
Mackerel (whole)	44.8	40.2	15.
Halibut (dressed)	17.7	61.9	20.4
Salt cod	42.1	40.5	17.4
Salt mackerel	40.4	28.1	31.5
Canned salmon	4.9	59.3	35.8
Lobsters	62.1	31.	6.9
Oysters	82.3	15.4	2.3

COMPOSITION OF FOOD MATERIALS.

Showing percentage of water, nutrients and minerals when freed from bones, skin, shell and other refuse:

Food.	Water.	Proteids.	Fat.	Starch and Sugar.	Mineral Matter.
Beef—Neck	62.	19.5	17.5	...	1.
Rib	48.1	15.4	35.6	...	.9
Sirloin	60.	18.5	20.5	...	1.
Round	68.2	20.5	10.1	...	1.2
Veal shoulder	68.8	20.2	9.8	...	1.2
Mutton leg	61.8	18.3	19.	...	.9
Pork—Shoulder	50.3	16.	32.8	...	.9
Smoked ham	41.5	16.7	39.1	...	2.7
Salted	12.1	.9	82.8	...	4.2
Fresh sausage	41.5	13.8	42.5	...	2.2
Chicken	72.2	24.4	2.	...	1.4
Eggs	73.8	14.9	10.5	...	.8
Milk	87.	3.6	4.	4.7	.7
Butter	10.5	1.	85.	.5	3.
Oleomargarine	11.	.6	85.	.4	3.
Cheese, full cream.....	30.2	28.3	35.5	1.8	4.2
Cheese, skimmed milk.....	41.3	38.4	6.8	8.9	4.6
Salt mackerel.....	53.7	17.3	26.4	...	2.6
Oysters	87.1	6.	1.2	3.7	2.
Wheat flour	12.5	11.	1.1	74.9	.5
Graham flour	13.1	11.7	1.7	71.7	1.8
Oatmeal	7.6	15.1	7.1	68.2	2.
Cornmeal	15.	9.2	3.8	70.6	1.4
Rice	12.4	7.4	.4	79.4	.4
Peas	12.3	26.7	.7	57.4	2.9
Beans.....	12.6	23.1	2.	59.2	3.1
Potatoes	78.9	2.1	.1	17.9	1.
Sweet potatoes	71.1	1.5	.4	26.	1.
Turnips	89.4	1.2	.2	8.2	1.
Onions	87.6	1.4	.3	10.1	.6
Apples.....	83.2	.2	.4	15.9	.3
Cabbage	91.0	2.1	.3	5.5	1.1
Sugar, granulated.....	2.	....	....	97.8	.2
White bread	32.3	8.8	1.7	56.3	.9
Boston crackers	8.3	10.7	9.9	68.7	2.4

THE HEAT-PRODUCERS.

The comparative heat-producing values of various foods is shown by the table below. The unit of heat is the caloric. A caloric may be defined as the amount of heat necessary to raise the temperature of a pound of water four degrees Fahrenheit.

One pound of proteids will produce 1,860 calori.

One pound of fats will produce 4,220 calori.

One pound of carbo-hydrates will produce 1,860 calori.

The amount of heat and energy required per day is:—

For a man with light exercise, 2,980 calori.

For a man with moderate muscular work, 3,520 calori

For a man with severe muscular work, 4,060 calori.

TABLE SHOWING FUEL VALUES PER POUND.

	Calori.		Calori
Beef, sirloin	970	Wheat flour	1,645
Beef, round	855	Graham flour	1,625
Beef, rib	1,405	Rye flour	1,625
Beef, shoulder	895	Buckwheat flour	1,605
Veal, shoulder	640	Oatmeal	1,850
Mutton, leg	935	Cornmeal	1,645
Fresh pork	1,435	Rice	1,630
Smoked ham	1,735	Peas	1,565
Chicken	330	Beans ..	1,616
Turkey	550	Potatoes	370
Eggs	655	Sweet Potatoes	530
Salt codfish	315	Turnips	185
Salt mackerel	910	Onions	225
Canned salmon	1,005	Tomatoes	80
Oysters	40	Cabbage	155
Cheese, whole milk	2,150	Apples	315
Butter	3,615	Sugar, granulated	1,820
Milk	670	Wheat bread	1,280
Molasses	1,320	Crackers	1,895

AMOUNT OF NUTRIENTS WHICH ONE DOLLAR WILL BUY.

Food.	Price.	Total Weight.	Nutrients
Beef, sirloin, per lb.....	15c.	6.67	2.14
Beef, round, per lb.....	10c.	10.	3.13
Beef, neck, per lb.....	8c.	12.50	3.80
Mutton, leg, per lb.....	14c.	7.14	2.23
Smoked ham, per lb.....	16c.	6.25	3.23
Salt pork, per lb.....	10c.	10.	8.37
Salt codfish, per lb.....	8c.	12.50	2.17
Salt mackerel, per lb.....	10c.	10.	3.15
Oysters, per qt.....	35c.	5.72	.62

Food.	Price.	Total Weight.	Nutrients.
Eggs, per doz.....	15c.	11.36	2.63
Milk, per qt.....	5c.	40.00	4.99
Cheese, whole milk, per lb.....	15c.	6.67	4.37
Butter, per lb.....	15c.	6.67	5.79
Butter, per lb.....	25c.	4.00	3.46
Sugar, granulated, per lb.....	5c.	20.00	19.56
Wheat flour, per lb.....	3c.	33.33	29.
Wheat bread, per lb.....	5c.	20.00	13.36
Cornmeal, per lb.....	2c.	50.00	41.80
Oatmeal, per lb.....	5c.	20	18.08
Rice, per lb.....	8c.	12.50	10.90
Beans, per lb.....	5c.	20	16.86
Potatoes, per bu.....	50c.	120	24.12
Apples, per bu.....	50c.	112	18.48
Crackers, per lb.....	10c.	10	8.93
Chickens, undressed, per lb.....	8c.	12.50	2.16
Turkeys, undressed, per lb.....	8c.	12.50	2.86

BILLS OF FARE.

The quantities of various articles which will furnish the proper medium amount of proteids, fats and starches for the daily diet of the average man at moderate labor, is shown in the following schedules, together with their approximate cost, as given in the foregoing table. Each will furnish about three pounds of gross food, and about one and a half pounds of pure nutrient material:

I.

Round steak	13 oz.
Butter	3 oz.
Potatoes	6 oz.
Bread	22 oz.
Cost, 24 cents.	

II.

Salt pork	4 oz.
Butter	2 oz.
Bread	18 oz.
Beans.....	16 oz.
Cost, 14 cents.	

III.

Sirloin steak	12 oz.
Butter	3 oz.
Potatoes	12 oz.
Flour	12 oz.
Milk	1½ pints.
Cost, 29 cents.	

IV.

Ham	12 oz.
Salt pork	½ oz.
Butter	1 oz.
Potatoes	8 oz.
Beans	5 oz.
Flour	12 oz.
Cost, 18 cents.	

V.

Chuck steak	10 oz.
Ham	6 oz.
Eggs	2 oz.
Flour	8 oz.
Butter	2 oz.
Potatoes	12 oz.
Sugar	1 oz.
Milk	1 pint
Cost, 26 cents.	

VI.

Round steak	6 oz.
Mackerel	12 oz.

Butter	2 oz.	Egg	1 oz.
Cheese	1 oz.	Butter	3 oz.
Potatoes	8 oz.	Potatoes	12 oz.
Oatmeal	1 oz.	Turnips	4 oz.
Wheat flour	8 oz.	Canned corn	4 oz.
Graham flour	4 oz.	Oatmeal	1 oz.
Sugar	2 oz.	Rice	1 oz.
Milk	1 pint	Wheat flour	4 oz.
Cost, 27 cents.		Graham flour	2 oz.
		Sugar	3 oz.
		Milk	½ pint
		Cost, 30 cents.	

VII.

Pork chop	8 oz.
Liver	8 oz.

DIGESTIBILITY OF FOODS.

The amount of nutrition which any article of food contains is quite independent of the time required for its digestion, thus, rice, which is digested in an hour, has more than seven times the nutritional value of boiled cabbage, the digestion of which requires four and a half hours; and fried salt pork, which takes four and one-fourth hours, contains more than five times as much nutrition as an equal weight of fresh apples, digested in one and a half hours.

In 1822, Alexis St. Martin, a Canadian voyageur, 18 years old, received a charge of duckshot in such a manner as to blow away a portion of the covering of his abdomen, and make a hole about an inch in diameter in his stomach, and, although under the care of Dr. Beaumont, a surgeon of the United States army, his wound entirely healed and he fully regained his health, married, reared a family, chopped and did other hard labor, and lived to the age of 84 years, the hole in his stomach never closed. It was partly closed, however, by a curtain or fold of mucous membrane which grew down inside, that was easily pushed back by his physician as often as he wished during a long and exceedingly interesting series of experiments, which shed more light upon the exact functions and mechanism of the stomach, and its mode of working, its secretions and their functions in the digestive process, than had been learned in all the centuries before.

The time required for the digestion of various articles of food, as thus ascertained by Dr. Beaumont, is given in the following table:

THE TIME REQUIRED TO DIGEST VARIOUS FOODS.

	H. Min.		H. Min.
Pigs' feet	1	Soup, bean, boiled.....	3
Tripe	1	Dumpling, apple	3
Rice, boiled	1	Corn cake	3
Eggs, whipped	1 30	Carrot, orange, boiled.....	3 15
Salmon-trout	1 30	Corn bread	3 15
Barley soup	1 30	Mutton, fresh, roasted	3 15
Venison, broiled	1 30	Pork chop, broiled.....	3 15
Apples, sweet, mellow, raw....	1 30	Oysters, fresh, roasted.....	3 15
Apples, sour, mellow, raw....	2	Eggs, hard boiled.....	3 30
Codfish, cured, dry, boiled....	2	Eggs, fried	3 30
Liver, broiled	2	Oysters, fresh, stewed.....	3 30
Milk, boiled	2	Beef, fresh, dry roasted.....	3 30
Beans, boiled	2	Beef with mustard, etc., boiled..	3 30
Tapioca	2	Oyster soup, boiled.....	3 30
Milk, raw	2 15	Chicken soup, boiled.....	3 30
Turkey, boiled	2 25	Butter, melted	3 30
Turkey, roasted	2 30	Cheese, old, strong, raw....	3 30
Goose, roasted	2 30	Mutton soup, boiled.....	3 30
Lamb, fresh, boiled.....	2 30	Turnips, boiled	3 30
Beans, green, boiled.....	2 30	Potatoes, Irish, boiled.....	3 30
Cabbage, raw	2 30	Beets, boiled	3 45
Potatoes, Irish, baked.....	2 30	Corn and beans, green, boiled..	3 45
Parsnips, boiled	2 30	Beef, fresh, lean, fried.....	4
Hashed meat and vegetables...	2 30	Salmon, salted, boiled	4
Custard, baked	2 45	Veal, fresh, broiled	4
Beef, salted, boiled	2 45	Fowls, domestic, boiled	4
Apples, sour and hard, raw....	2 50	Fowls, domestic, roasted.....	4
Oysters, fresh, raw.....	2 55	Pork, recently salted, fried....	4 15
Eggs, soft boiled.....	3	Beef, old, hard, salted, boiled..	4 15
Bass, fresh, broiled.....	3	Veal, fresh, fried	4 30
Beef, fresh, lean, rare, roast...	3	Cabbage, boiled	4 30
Beefsteak, broiled	3	Duck, wild, roasted	4 30
Mutton, fresh, boiled	3	Pork, boiled	4 30
Mutton, fresh, broiled.....	3	Pork, roasted	5 15

It has also been learned that food digests most quickly when very finely divided, as by thorough chewing; when eating is followed by a period of rest; and when little liquid is taken at the time of eating; also that digestion is retarded when food is taken when there is great bodily fatigue, or during strong emotion or excitement. Articles fried in fat are generally hard to digest. Food should not be eaten either very hot or very cold, it should be eaten at regular hours, and there should never be any piecing between meals.

CHAPTER VII.

THE TEETH.

By ALFRED C. SLOAN, D.D.S.

Standing at the outer portal of the human body, the teeth give beauty, symmetry and expression to the face, but their principal office is the performance of the main portion of the mechanical part of digestion. By grinding the food into small particles and mixing it with the saliva, they reduce it to the condition most susceptible to the action of the stomach and intestines. When some of the teeth become diseased, or are imperfect, or missing, the remainder are unable to properly perform the duty of all, and the food goes to the stomach in much the same condition as that eaten by birds, and the pangs of indigestion with its train of ills result.

It is fully established that diseases of the teeth, as well as most other diseases, are due to germs. The mouth is an ideal breeding place for micro-organisms, since its warmth, moisture and abundant food, all favor their unlimited multiplication and development. Food passed into the stomach through a filthy mouth is in no condition to produce pure healthy blood, for from diseased, carious and abscessed teeth the food is mixed with the debris of decay, and ferments or poisonous, disease-producing bacteria. When long continued these causes alone are sufficient to produce serious derangements of the alimentary canal; and many cases of blood poisoning, by pus from diseased teeth, are recorded in medical and dental literature.

From these facts it may be seen what dire results may follow neglect, and how important it is that the teeth should receive intelligent care. This should date from the time when the first ones begin to appear, which, usually, is when the child is from six to eight months old. The first to arrive are the central incisors; then the lateral incisors, first molars, cuspids and second molars come in the order named, the last ones appearing at from the eighteenth to the twenty-fourth month, and completing the temporary set—twenty in all, ten above and ten below.

The mother should give her careful personal attention to the teeth of the baby, always remembering that a tooth is not complete when it emerges from the gum, and that it will be a good year and a half later before its roots are fully formed. Wrap a piece of soft linen around the finger and gently cleanse the baby's teeth. When the eight front teeth are all in place, a badger's hair baby tooth brush may be substituted, for these brushes are so soft as to do no harm. Brush from the gum towards the cutting edge, thus removing the particles of food from between the teeth, and when the back teeth come, brush their grinding surfaces as well as their sides. It has been positively proven not only that caries in teeth is due to micro-organisms, but that a colony of these germs forms lactic acid abundantly in twenty-four hours, and that this acid by acting directly upon the tooth produces its decay. The germs find lodgment in the seams and pits on the grinding surfaces of the back teeth and between the teeth, hence the necessity of cleansing them thoroughly in all their parts. Have decayed teeth filled, thus stopping further decay, and have those crowned that have gone too far to be filled.

THE TEMPORARY TEETH.

The preservation of the temporary teeth of the child is a matter of much importance. Remember that he has but twenty teeth, while you have thirty-two, sixteen in each jaw, and that thorough mastication of food is as essential to him as to you, for which reason alone the loss of one tooth would be a serious matter; but there is another very important reason for preserving as long as possible the first teeth, and that is the injury which their early loss exerts upon the dental arch. The teeth are partly held in place by the lateral pressure exerted one upon another. When one is removed this mutual support is gone, and gradually the teeth nearest the opening are crowded into it, until, as often happens, the vacant space is entirely obliterated, hence when the permanent tooth for this place is formed it is forced out of the arch, and a crooked deformity results.

As the permanent teeth develop, the roots of the temporary teeth are absorbed to make room for them, but the roots of a temporary tooth whose nerve has died are not absorbed and, therefore, become an obstruction to the eruption of the new tooth, forcing it aside and causing a serious malformation. Do not think

it money ill spent to have the first teeth filled and thus preserved as long as possible. As soon as a cavity shows itself have it filled, instead of waiting until the tooth aches, and your child will not be hurt, then when the time arrives for the permanent teeth to come, the roots of the temporary ones will be entirely absorbed so that their crowns can be picked off without pain, and a set of new teeth, symmetrical and beautiful, will develop in their place. The common practice, of pulling the child's teeth with a cord or other device, as fast as they begin to loosen, is a most pernicious one, and results in irreparable distortion of the second teeth, if not of the jaw itself.

Tooth Powders are numerous, but none excels precipitated chalk, a preparation to be had for a few cents at any drug store. It is a soft, tasteless antacid, absolutely non-injurious and when systematically used is one of the best, if not the very best, of all the preservatives of dental structures. It removes any light discoloration, but will not remove dark heavy stains or tartar, and any preparation that will, or that is advertised to do it, should be shunned, for its use cannot be other than injurious to the teeth. Have nothing to do with it.

If in place of the chalk you wish a nicely flavored dentifrice, use Oraline Tooth Paste, prepared by the S. S. White Mfg Co., or Enthymol Tooth Paste, put up by Parke, Davis & Co., for neither of these will in anyway injure your teeth.

Mouth-washes.—When you have decayed teeth, or inflamed spongy gums, with an unpleasant taste, and odor to the breath, a mouth-wash is needed in addition to the dentifrice. An excellent one can be made by adding to either Listerine, Enthymol, Borolyptol or Pastrine three times its volume of water. After cleansing the teeth, thoroughly rinse the mouth with this wash, and if there is irritation of the throat, as is frequently the case with an impure breath, gargle the throat with the wash. It will remove all odors, and, besides being curative, will impart a pleasant sense of cleanliness and purity. A thorough and systematic use of such a wash two or three times a day is an imperative necessity in the mouth of a person wearing bridge work, and should be used also by those wearing artificial teeth, to rinse both mouth and plate after cleansing them. It will insure a cleanliness that can be attained in no other way, and keep at the minimum the many little irritations of the delicate mucous membrane on which the artificial dentines rest.

Salivary Calculus, or, as commonly termed, tartar, is composed of lime salts held in solution in the saliva and deposited upon the sides of the teeth, forcing back the gums, and causing their absorption, also the absorption of the bony walls of the sockets of the teeth. If allowed to remain it slowly increases, then causes inflammation of the gums and loosening of the teeth—a condition often erroneously called scurvy. Its cure is effected by a thorough and careful removal of all deposits, even though they reach below the gums, by a competent dentist, who will advise as to what local treatment, if any, should be applied to the gums. When you find any tartar collecting upon your teeth have it removed.

In employing a dentist, be sure to retain a good one; do not let the main consideration be cheapness. Cheap dental work, like cheap work in everything else, is likely to be dear at any price, and you have but one set of permanent teeth.

Although the teeth should be cleansed every morning, it is still more important to give them attention just before retiring at night. At both times first rub them and the gums on both sides of the teeth, with precipitated chalk, then follow with a good brush and rinse well. In case the sides of the teeth become tender discontinue the chalk a few days. He that cares for his teeth by simply brushing them on the front or outside does not live up to his privileges.

During sickness the teeth are usually neglected. They should be kept clean, and if the patient is too ill to attend to them it must be done by the nurse, who should, with a piece of soft linen, dipped in the wash described above, clean them as well as she can, then have the patient rinse the mouth with the same kind of wash. It will be exceedingly grateful to the sick one. The decay of teeth during sickness is not as much due to strong medicines used, as to the altered condition of the fluids of the mouth at this time. A person under homeopathic treatment suffers as great injury to his teeth as the allopathic patient does.

During the nine months of pregnancy the teeth decay more rapidly, and may become abnormally sensitive, causing great suffering. Much of this can be alleviated, in many cases entirely overcome, and the decay retarded in a marked degree, by the use of Phillips' Milk of Magnesia. The teeth should be cleansed night and morning with the mouth-wash described, after which a teaspoonful of the Magnesia is to be taken into the mouth and

allowed to float around over the teeth. It will thus coat them with a film of magnesium hydrate, which is sufficiently adherent to protect them from acid action for a number of hours. The fluids of the mouth during pregnancy are nearly always acid, and it is probably due to this that the teeth are then so sensitive. After using the milk of magnesia do not rinse the mouth, but spit out any excess. This remedy will be found serviceable also in the vomiting of pregnancy, especially when acidity of the stomach exists. Dose: One teaspoonful as may be required.

In jumping toothache from an exposed nerve, nothing will bring comfort sooner than strong carbolic acid placed directly on the nerve. This is best accomplished by placing loosely in the cavity a bit of cotton saturated with the acid, and covering it with a little dry cotton, beeswax, or other substance to keep the tongue from the acid. (The relief afforded is only temporary, but the application may be repeated as often as necessary until treatment can be obtained from the dentist.) Care must be taken not to get any of the acid on the gum, or other tissues, but in case of such an accident the burning may be stopped by touching the spot with glycerin or oil. Oil of cloves, laudanum, creosote, etc., are also often used for toothache. The following compound is excellent:

Best alcohol	one-half ounce.
Chloroform	one ounce.
Sulph. ether	three drams.
Gum camphor	two drams.
Laudanum	one-half dram.
Oil of cloves.....	one-fourth dram.

Plug the tooth with cotton saturated with this cordial. The pain following extraction of a tooth can be relieved by pressing a pledget of cotton, thus saturated, well up into the socket and leaving it there an hour or two, and a little powdered tannin on the side of the pledget first entering the socket will prevent hemorrhage. The most stubborn toothache of pregnancy may be relieved by bathing the tooth and gums with this preparation, then drawing in the breath a few times to pass the air over it. This is also an excellent application for swellings and bruises where the skin is not broken.

CHAPTER VIII.

STIMULANTS AND NARCOTICS.

By LOUIS C. DUNCAN, M.D.

ALCOHOL.

The deleterious effects of alcohol have been so often and fully set forth, it would seem a superfluous work to write of them again. Every volume on medicine and every school book on physiology and hygiene tells of destruction, suffering and death wrought by alcohol. Societies make war upon it, lecturers denounce it and tracts emphasize its evils; but the disease and misery in evidence in every community prove that the lesson has not yet been learned, that its teaching must be continued, and the physiological effects of alcoholism, if possible, made still more clear and convincing.

It is not our purpose to detail many of its most serious effects. The moral degradation of the drinker, the deterioration of intellect, the crimes and accidents resulting from drink, the wretched poverty, the breaking up of families, the misery of women, the suffering of children, and all the crime and debauchery following in the wake of alcohol we must leave to others. We have only to speak of its physiological effects, the diseased conditions produced by its action in the human body, though most will agree that harmful as these are, they are not more serious than its influence upon the intellect and morals of its victim. Alcohol is indeed an enemy that steals away the brain, the keenness of perception, the accuracy of judgment, the power of continued thought and, above all, the fine distinctions between right and wrong that characterize the upright man.

General Effects.—In sufficient quantity, alcohol at first produces quickened action of the heart and lungs, a slight rise in temperature, an increased supply of blood to the brain and internal organs, increased muscular activity, and a general sense of well being; the senses are more acute, the imagination is stimulated, ideas come more readily; the face is flushed, the eyes bright and

the tongue loose. The speaker is more eloquent, but his judgment and reason are less sure. Following these effects the temperature falls to below normal, the muscles become unsteady, the tongue "thick," the gait staggering and speech incoherent. At this stage the drunkard may be very good natured and happy, or ill natured, morose and quarrelsome. Finally he can walk no longer, speech fails, and he passes into a stupor. The face is red and congested, the breathing slow and stertorous, the breath smells of alcohol and he can be only partially aroused. Such are the immediate effects of alcohol. After the debauch is over, the patient returns to his normal condition, not seriously damaged physically; but if one debauch follow another, or if he contract the habit of drinking a small amount each day, permanent and serious injury will certainly follow. It may be long delayed but it is sure to come.

All experience in severe athletics, military campaigns, and North Pole and other expeditions involving fatigue, exposure and long tests of endurance, show that the total abstainer withstands these adverse conditions better than the toper, or even the moderate drinker. Lieut. Peary, in his inventory of supplies for his last trip toward the Pole, stated that no liquors were to be taken except those required by the surgeon, for not only are the highest achievements possible without the aid of liquors of any kind, but their continued use lowers the power of resistance, the vitality of the body, rendering it less able to endure fatigue, extremes of temperature and injury. It is well known by all surgeons that habitual drinkers do not bear anesthetics or stand surgical operations well, and that they are more seriously affected by injuries and all severe acute diseases.

Let it not be supposed that the claims as to the evils caused by alcohol are figments of the mind, due to the excited imaginations of over anxious mothers, or too zealous temperance fanatics. Such eminent authorities as Drs. Revilliod and Binet, Professors in the University of Geneva, Switzerland, as translated by Dr. Law, set forth their physiological effects as follows:

"The morbid conditions brought about by alcoholism involve every organ and tissue of the body, and consequently disturb every one of its physiological functions, sometimes giving rise to special diseases characteristic of alcoholic poisoning, at others producing complications arising in the course of various maladies.

"The organs specially affected by alcohol, taken as a beverage, are, first of all, the stomach. After passing through the liver these alcoholic drinks, more or less modified, enter the general blood stream and circulate throughout every part of the body; but we wish here to specially refer to the kidneys, the heart, and the brain. The morbid alterations induced in these parts by the constant presence of alcohol in the tissues of which they are composed, though at first comparatively trifling and temporary, become permanent and incurable sooner or later, according to the quantity of alcohol usually consumed and the duration of the drinking habit.

"The accompanying plates show the various changes and diseased conditions of the organs referred to. They are reproductions from nature by experts in such subjects, viz.: (1). Dr. Lancereaux, Physician to the Hotel-Dieu in Paris, well known by his works on Alcoholism; (2). Professor Charcot, who illustrated his lectures on diseases of the liver and kidneys by a representation of the affections of the kidneys, in which excessive alcoholic indulgence played the chief part. These are the 'large white kidney' so named by Richard Bright, M. D., of Guy's Hospital; and the 'contracted kidney,' from a drawing by Dr. Gombault, Physician to the Beaujon Hospital in Paris. These designs, executed by the experienced hand of M. Balicki, and here faithfully reproduced, show each organ as it would appear if actually before the eyes. Each plate exhibits for comparison the parts in their healthy, as well as in their diseased state.

PLATE I. THE STOMACH.

"Fig. 1. *Normal Stomach*.—Laid open to show its internal surface lined by healthy mucous membrane. The organ, here represented moderately distended, varies much in size according to the amount of food contained, and the habits, as to eating and drinking, of the individual. The inner surface of the stomach, like that of the rest of the alimentary canal, consists of mucous membrane. This mucous lining is smooth, velvety, and moist, and varies in tint from pale rose to a reddish violet—as anyone may see for himself by looking at the mucous membrane of his mouth in a mirror. When not distended it lies in folds. The mucous membranes constitute the inner coating of most of the cavities of the body, they serve as a basis of support to the blood



FIG. 1.

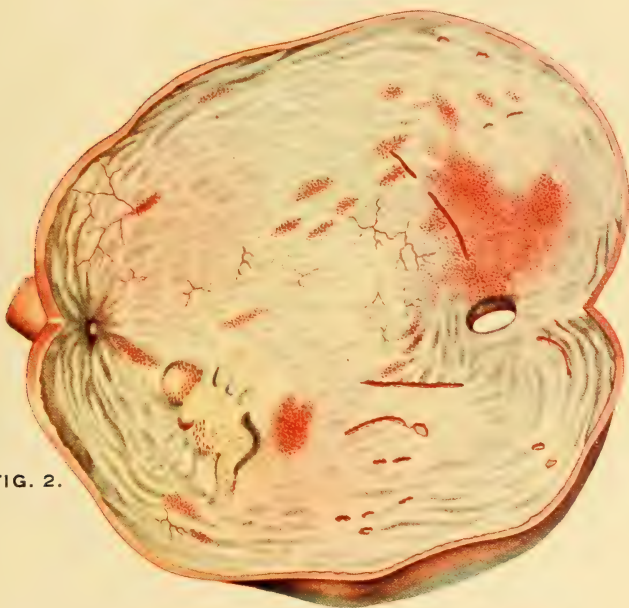


FIG. 2.

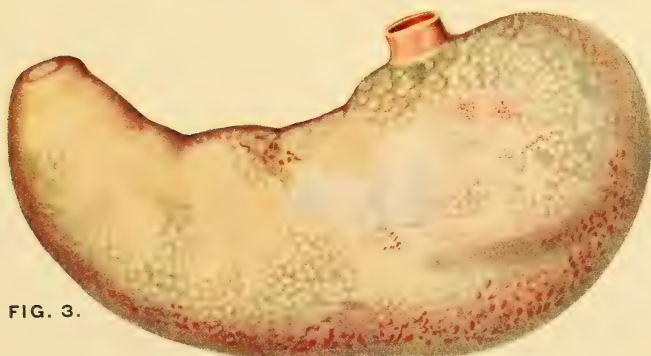


FIG. 3.

PLATE I.

FIG. 1. A Healthy Stomach.
FIGS. 2 and 3. Alcoholic Stomachs.

vessels and nerves, and to the glands which secrete the gastric juice and the mucus which lubricates the lining membrane.

"Figs. 2 and 3 represent *Alcoholic Stomachs* seen from their internal aspects.

"Fig. 2. *Stomach*.—Laid open longitudinally to display its mucous lining on which are clearly shown the following lesions: (a). Patches dotted with bright red, showing intense inflammatory congestion, or slate colored, due to small extravasations of blood of long standing. Here and there are noticed small rounded, or linear, ulcers which appear to follow the course of the blood vessels. Below, on the left, we may observe a large star-shaped scar showing the former existence of a vast ulcer, which has destroyed the mucous membrane and its subjacent layers at this place. This ulcer must have given rise, during life, to severe vomiting of blood. If its cause be not invariably found in alcoholic excess, its cure demands, none the less, complete abstinence from spirituous liquors.

"Fig. 3. *Stomach turned inside out* like a glove to show its mucous lining. The latter, instead of being soft and velvety, as in the normal state, presents a papillated condition due to thickening of the mucous membrane and submucous glands. Towards the center is seen a large opaline white patch. The general tint, which, in the normal state, is uniformly roseate, is here, in some places slate colored, in others, light purple with black dots due to old extravasations of blood in the various layers of the coat.

"One of the first deleterious effects produced by alcoholic abuse, and one experienced by all drinkers, is Mucous Catarrh. Upon waking in the morning the mouth is dry and clammy and there is oppressive thirst. Very soon, either upon first rising and moving about, or after gulping down liquid, the stomach contracts and expels a glairy, ropy fluid sometimes mixed with bile. At a more advanced stage, when to simple catarrhal irritation, there has supervened inflammation of the organ with the serious lesions depicted in Plate I, Figs. 2 and 3, the digestive functions become deranged and are accompanied by eructations, vomiting, pain, and a sensation of burning at the pit of the stomach; the appetite is lost, diarrhea, sometimes alternating with constipation, occurs and the patient loses flesh. When ulcerations have been produced the taking of food is often followed by very severe pains; vomiting sometimes attains excessive frequency, the vomited mat-

ter taking on a black tint from the presence of altered blood, or there may be actual hemorrhage. In such cases death may be speedy.

PLATE II. THE LIVER.

"Fig. 1. *Normal Liver*.

"Fig. 2. *Enlarged Liver*.

"One can readily understand why this organ, which directly receives the liquids absorbed from the stomach, should be the first to be injured when these liquids, by their quality, are of such a nature as to alter the substance of the organs they pass through. Alcohol, which is of that number, produces eventually an increase of each of the anatomical elements of which the liver is composed, and consequently of its entire bulk. By and by, this process specially affects the bile ducts, causing increase in their number and size, and ending by obstructing them. A work of disorganization results, which invades the substance of the organ, and, of course, perverts its functions. This variety seems to us to specially pertain to excessive drinkers of beer and white wine.

"Fig. 3. This is the small *contracted liver*—atrophic cirrhosis—a variety which may be called characteristic of that organ in alcohol drinkers. In England, it is known as gin drinker's liver. In this variety, the liver, which must at first have undergone a stage of enlargement, is now, so to speak, reversing the process. It shrinks progressively, becoming more and more contracted within an enveloping membrane, which sends fibrous prolongations into the substance of the liver, choking with a scar-like tissue the proper secreting elements of the gland. Alcoholic cirrhosis, or hardening of the liver, is one of the most frequent diseases of drunkards. After a longer or shorter period of digestive troubles, the disease is characterized by effusion of fluid into the cavity of the abdomen, caused by the difficulty of carrying on the circulation through the hard shrunken liver. The belly becomes enormous, and by its size contrasts with the general emaciation of the individual; while upon its surface the subcutaneous veins, engorged with blood, testify to the obstacles placed in the way of circulation. If, to relieve the patient, we draw off by an operation, the fluid from the belly, it may amount to twenty-five, or even thirty-five, pints. The relief thus obtained is only temporary; the fluid is usually re-formed very shortly. Hemorrhages are frequent. There is often bleeding of the nose;



FIG. 1.

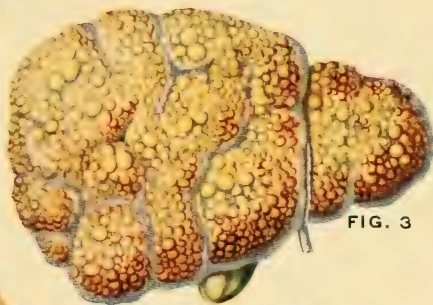


FIG. 3.

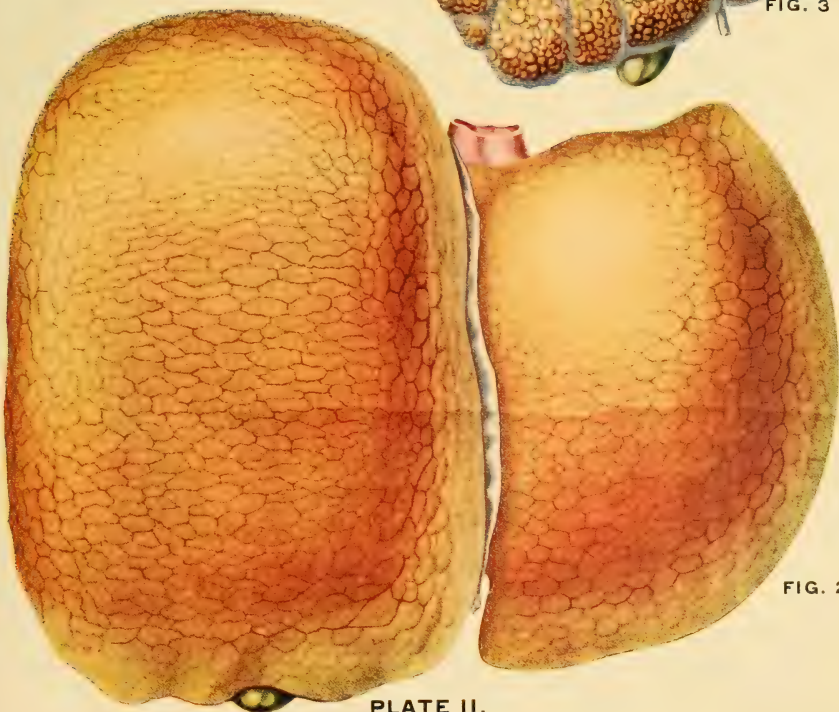


FIG. 2.

PLATE II.

FIG. 1. Healthy Liver. FIG. 2. An Enlarged Liver.
FIG. 3. A Contracted or "Gin Drinkers" Liver.

at other times, spitting or vomiting of blood. There is seldom true jaundice, but the skin assumes an earthen tint, the patient emaciates more and more, and death seldom fails to supervene within one or two years, and often indeed much sooner. Cure is altogether exceptional.

PLATE III. THE HEART AND KIDNEYS.

“Fig. 1. *The Normal Heart.*

“Fig. 2. *The Heart completely enveloped by fat.*—This adipose layer is able to penetrate also into the substance of the heart, separating the bundles of muscular fibers which often themselves become the seat of fatty degeneration. Alcoholism is a frequent cause of this lesion, which leads to death by the disturbance produced in a function so important as that of the central organ of the circulation.

“Fig. 3. *The Normal Kidney.*—The kidneys act in cleansing the organism. The circulation here is very active, and carries to them all the substances in the blood which, because they are either wastes, superfluous, useless, or noxious, have to be eliminated. But the texture of these organs is very delicate, and is easily altered if the blood conveys to them an irritant substance, such as alcohol.

“Although the alcohol has undergone a partial chemical transformation in the organism before reaching the kidneys, it nevertheless retains, where taken in large quantity, its noxious effect upon the blood vessels of the kidneys, and the uriniferous tubules. We recognize here, as in the liver—Fig. 4—*an enlarged kidney*, ‘the large white kidney,’ and—Fig. 5—a small, *contracted or atrophied kidney*. These are different forms from an anatomical point of view but they may be combined in the same individual.

“Besides the lesion of the heart mentioned above, alcohol produces circulatory troubles, and alterations in the vessels which react in an injurious manner on all the organs. The diseases of the kidneys represented in Plate III, Figs. 4 and 5, are, unfortunately, very often observed under the influence of numerous causes independently of any alcoholic excess; but they are also frequently the consequence of abuse of alcoholic beverages. We may well ask whether the great frequency of these diseases at the present day, is not accounted for in a certain measure, quite apart from actual drunkenness, by the long continued and somewhat too free indulgence in habits of drinking. The kidneys thus

affected, on the one hand, permit the albumen of the blood to pass away in the urine—albuminuria—which constitutes a loss to the organism; on the other hand, they do not fulfill their cleansing office, and the dangerous substances, which they are charged with the duty of eliminating, gradually accumulate in the blood. This gives rise to a series of symptoms of poisoning, often fatal, known by the term uremia. These sometimes take the form of convulsive seizures, at others of loss of consciousness; often, also they are shown by an extremely distressing feeling of suffocation, by violent headaches, or by repeated vomiting. The circulation is frequently deranged during the course of kidney disease. It may then give rise to effusion of fluid into the serous cavities, and the subcutaneous cellular tissue—a state well known under the name of dropsy.

PLATE IV. * THE BRAIN.

"Fig. 1. *Normal Brain with its coverings* (Membranes).

"Fig. 2. *Alcoholic Meningitis*.

"We are too well acquainted with some of the disorders of the nervous system which may result from excessive drinking. It is not necessary that functional derangement should always be accompanied by permanent lesions that can be recognized in the brain after death. It may even happen that a fatal termination may occur without the disease having left behind any material trace during its course. On the other hand, the complex conditions which interfere with the daily existence of the drunkard, the bruises, brain joltings, etc., form a large proportion of the lesions we are able to find after death. Nevertheless, as has been stated by Dr. Lancereaux, there exists an alteration peculiar to alcohol which specially affects the membranes of the convexity of the brain. These, which in the healthy state are thin, delicate, and transparent, become thickened, opalescent or opaque, and scattered throughout with minute patches and small whitish elevations (Fig. 2). In the acute stage, in case of death, during an attack of *delirium tremens*, we may find, moreover, an intense vascular injection, which imparts to the convex surface of the brain a bright rosy tint. Blood may even be extravasated upon the surface. These lesions affect those membranes most closely applied to the brain. The dura mater, the outermost covering, a thick white membrane which lines the internal surface of the skull, may also, under the influence of chronic alcoholism, become vascular-

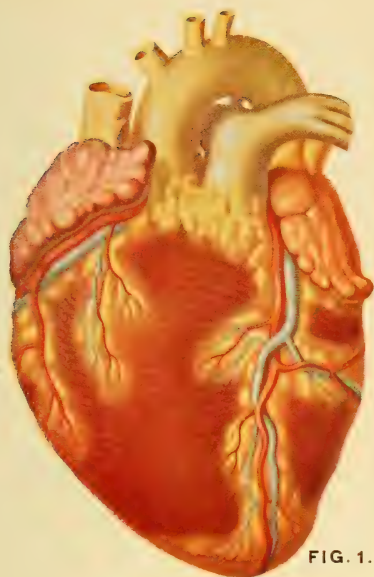


FIG. 1.



FIG 2.



FIG. 5.



FIG. 3.



FIG. 4.

PLATE III.

FIG. 1. A Healthy Heart.

FIG. 2. An Alcoholic Heart.

FIG. 3. A Healthy Kidney.

FIG. 4. An Enlarged Kidney.

FIG. 5. A Contracted Kidney.

ized, and give rise to repeated hemorrhages forming layers of blood clot, which by their thickness exercise a gradually increasing compression of the surface of the brain. The latter, in its turn, may participate in the inflammatory trouble, when various disturbances of the nervous system may result, such as weakness and perversion of motion and sensation, enfeeblement of the intellectual faculties, madness, and all the symptoms of an advanced form of general paralysis.

"The nervous disturbances produced by alcohol are very numerous. First, there are the acute phenomena characterized by excitement of the nervous system, constituting *inebriety* or *drunkenness*. In an extreme case, this ends in *coma*; that is to say, complete loss of consciousness and muscular power. This condition, the result of heavy drinking, sometimes terminates in death. Among the more chronic manifestations are to be noted trembling, which often impedes delicate manual operations, disturbances of sensation, perversions of the organs of the senses, enfeeblement of intelligence and memory, bad dreams, etc. Attacks of delirium may supervene with fever and terrifying hallucinations, general trembling, and brutish impulses. These attacks are known under the name of *delirium tremens*. Abuse of alcoholic liquors sometimes produces also weakness of sight, the result of an inflammation of the nerves which place the eyes in communication with the brain (optic nerves). The dimness of vision is specially pronounced in looking at small objects or doing close work, such as reading, writing, or fine mechanical work. Occasionally the patient is unable to distinguish colors. This affection of the optic nerves is quite comparable with the paralysis of the nerves of the limbs, which is sometimes observed in alcoholic subjects. It rarely proceeds to blindness, but it may cause more or less complete incapacity for work.

"The lesions, which are shown in Plate IV, at first affect the membranes and lead either to mental alienation or to convulsive or apoplectiform seizures, which often prove fatal.

"Lastly, it is important to draw attention to the injurious influence which alcoholism in parents exercises over the nervous systems of their offspring, who are born to the sorrowful heritage of a predisposition to insanity and mental degradation."

Alcoholism is recognized as one of the direct causes also of *epilepsy*, a disease which is not only practically incurable, but fre-

quently leads to insanity, and is likely to be stamped upon the children of the drunkard in the form of consumption, epilepsy, feeble-mindedness, insanity or idiocy.

TOBACCO.

So much had been said for as well as against tobacco, many had come to believe that any treatment of the subject would result only in an assertion of the preconceived opinion of the investigator, and that while the tobacco habit was injurious to some, to a much larger class it did no harm; but in later years, as more scientific methods of inquiry have been employed, and its effects upon individuals have been grouped together in classes sufficiently large to secure reliable averages, indisputable and startling facts have been discovered.

The composition of the dried tobacco leaf has long been known. Besides starch and various acids and salts, its two essential elements are nicotine and nicotianine. The former, a colorless liquid alkaloid with an odor of tobacco and a sharp burning taste, turns to a dark brown and dries to a resinous gum on exposure to the air, and is one of the most virulent poisons known—a single drop of it being sufficient to kill a dog. The latter is an oil, and scarcely less poisonous than the nicotine, which it resembles in odor and taste. In mode of action both are much like Prussic acid, and almost as deadly, and both have narcotic properties, the principal qualities which give tobacco fascination for its devotees, but the alkaloid has properties distinct from those of the oil, and each is said to act differently from the other upon the various vital organs of the body. Thus, the smoker, who gets less of the alkaloid but more of the oil than the chewer, is affected in ways quite different from those experienced by the latter, yet it may be impossible to say that the one is injured less than the other.

The proportion of nicotine in Havana dried leaf is usually from one to two per cent, but in many varieties grown in Northern States it is seven or eight per cent. Burning tobacco does not destroy its nicotine; as high as 84 per cent of it has been recovered from the smoke. Hence, from each ounce of strong tobacco used, making liberal deductions for all possible waste, the smoker draws into his mouth several grains of the deadliest poisons known. That they do not kill him instantly is largely due to his blowing them nearly all out again, but a good deal of the portions which

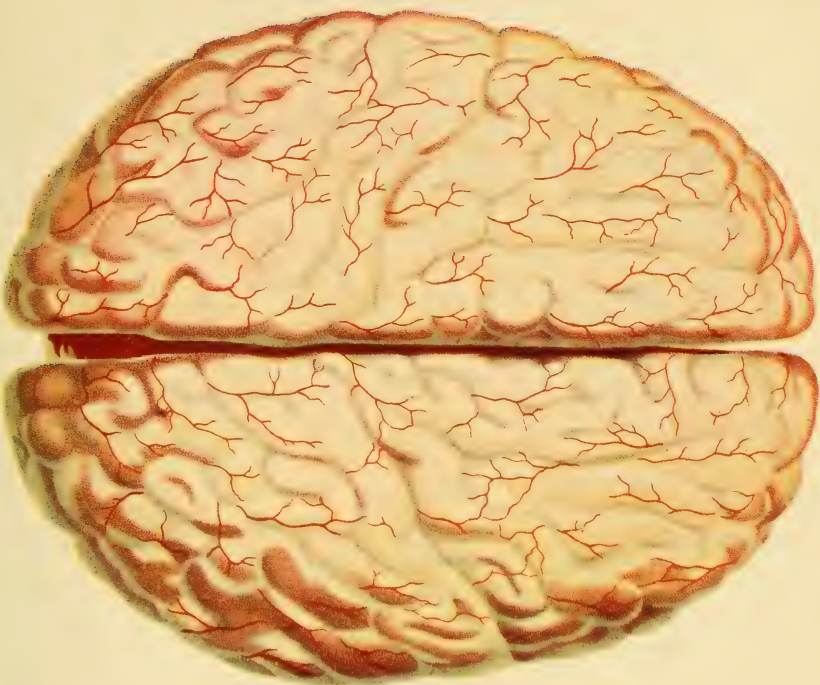


FIG. 1.

A Healthy Brain.

PLATE IV.



FIG. 2

An Alcoholic Brain.

come in contact with the moist membranes is quickly absorbed, as shown by the headache, dizziness, deathly pallor, distorted features, feeble pulse, labored breathing, faintness, salivation, and often by the vomiting and violent abdominal pain, of those just learning the art. After repeated protests the system comes to tolerate it because the nerves involved become so dulled or deadened as no longer to be able to resist.

Having reached the tolerant stage many appear to be able to use tobacco without any ill effects, but the proportion of those who can really do so is much smaller than is generally supposed. Of this a proof was furnished on a large scale at the breaking out of war with Spain, in the great number of would-be-volunteers rejected because of heart disorders, due in most cases to smoking. It is claimed that 90 per cent of the cigarette smokers offering themselves were unfit for military service for this reason. Indeed, so frequently have heart troubles been traced to this cause, it has become a common statement that what alcohol is to the brain tobacco is to the heart, an assertion partly true, but misleading if understood to mean that the brain is not also injured. The peculiar action of nicotine upon the heart is explained by physiologists as due to its special influence upon the vagus, the great nerve of that organ, paralyzing its activity, thus "leaving the uncontrolled heart muscle to wear itself out."

The lungs also suffer from tobacco. The constantly increasing mortality in the French army is charged to pulmonary diseases favored by cigarette smoking, for while other presumable causes are no more active now than formerly, this one during the last few years has been steadily growing. The specially serious effects of the cigarette are no longer charged to adulterations of the tobacco, or of its wrapper, but to the facility cigarette smoking affords for excessive indulgence; to the common practice of inhaling its smoke, when of mild tobacco, thus adding the entire inner surface of the lungs to the poison-absorbing area; and to the completeness with which the end held in the lips is burned, a result being thus obtained similar to that experienced by a cigar smoker, who partly smokes, partly chews his cigar, thus getting all the poison which the stub had filtered from the smoke; or by the excessive smoker of a dirty cutty. Like opium it quiets the nerves for a time, but becomes an irritant later.

To afford an opportunity for the study of tobacco effects upon

the brain, the students in a polytechnic school in Paris were some years ago divided into two classes, smokers and non-smokers. In the averages of work done, and in the competitive examinations, during the four years' course, those who did not smoke far outstripped the others.

More recently, a somewhat similar comparison between users and non-users was made at Yale, and some of the results of four years of careful observation were as follows:

Increase in height.....	20	per cent greater in non-users.
" " weight.....	25	" " " "
" " lung capacity.....	66	" " " "
Inflated chest measurements.....	19	" " " "

Although 30 per cent of the class used tobacco, all its prominent athletes, with but one exception, were non-users, and none of the candidates for the crew used it.

At Amherst a similar study disclosed even greater differences. They were as follows:

Increase in height.....	37	per cent greater in non-users
" " weight.....	24	" " " "
" " chest girth.....	43	" " " "
" " lung capacity.....	75	" " " "

Upon these facts the director of the physical laboratory of Yale remarks: "The widely differing growths in lung capacity point to the influence of tobacco on respiration. Inspiration is essentially a muscular act, and as such is seriously impeded by nicotine. But even further than this must act the irritating substances of a smoke which readily causes inflammation and soreness of any mucous membrane. Now, to fully expand the lungs under such conditions is uncomfortable, if not impossible, and respiration degenerates into an incomplete act."

Very strong testimony, too, as to the injurious effects of tobacco poisons on the brain, and consequent depression of mental activity, is found in the records of Yale which show that of all the students who entered that college during a period of nine years the average age of non-users was fifteen months less than that of the users of tobacco.

Amaurosis, a form of partial or total blindness resulting from disease of the optic nerve, may primarily be due to so many different things that it is often hard to point to the cause, but Hutchinson found that in 37 cases of amaurosis from white atrophy of the

optic nerve, 31 of them occurred in immoderate smokers. Tobacco is positively known to be the cause in many cases, and as its irritating effects upon the nervous tissues are no longer questioned the smoker whose sight is failing rapidly may well suspect his habit. Indeed, by an examination of the eye, the results of the prolonged use of tobacco can often be clearly seen in the optic disc—the end of the optic nerve, the only large nerve accessible to ocular observation.

Although the processes employed in the manufacture of snuff render it less poisonous than the tobacco of which it is made, its use seems to cause a profound depression not only of all the bodily senses, but, to an even greater degree, of the higher mental qualities, as often seen in loss of pride in character and appearance, diminished ambition, disregard of surroundings and indifference to the opinions of others; with continuance of the habit delusions may appear, a low form of dementia or melancholia follow, and death come from some acute disease to which the condition predisposes.

It is not well enough understood, even by intelligent people, that tobacco is rich in insidious poisons, often cumulative in action, and deadly in result. Although formerly used as a medicine, it is now almost entirely discarded because too dangerous, either to be given internally, or applied to the skin. Among the disorders of which it may be an exciting cause are indigestion, dyspepsia, cancerous affections of the tongue and throat, congestion of the brain, loss of memory, nervousness, deafness, paralysis, insanity, emasculation, loss of courage, and lessened power of resistance to disease.

Treatment.—By far the best, if not the only treatment for the tobacco habit is to abruptly and entirely quit, then through the aid of Turkish baths, vapor baths, wet packs, or any other device for causing profuse perspiration, get the accumulated poisons out of the system as quickly as possible. Place no dependence upon substitutes, or any of the so-called cures, but assert your will-force and mastery over self. Let tobacco entirely alone and keep away from those who use it, and in ten days or less the appetite for it will be nearly or entirely gone.

In the government schools of this country and those of some European countries, where the directors, unhampered by considerations of income from tuition, are free to manage pupils in

the most scientific manner for their highest good, the use of tobacco is forbidden, and the same advanced step is being taken in many private schools. As the habit has grown to such proportions that the people of the United States are spending about as much for tobacco as for flour, the time has certainly arrived when its use should be prohibited in all our schools.

MORPHIOMANIA.

Opium is obtained from the juice of green poppy-buds, is a very complex substance possessing many properties, and, for numerous diseases, is an excellent medicine, both for allaying pain and promoting a cure, but no other drug is more sadly perverted. Opium smokers and opium eaters are found throughout the world, though the practice is by far the most prevalent in the orient, especially in China, where it has become so general as to be a national calamity. To obtain the temporary ease and delight which give the vice its charm the victim must continuously increase the dose until, in a few years, it becomes many times larger than that required to cause certain death in one unaccustomed to its use. But, finally, a time arrives when in any amount it fails to bring the desired relief, and the patient is reduced to a condition of physical and moral degradation wretched in the extreme. When thoroughly formed the habit is seldom cured, for so great is the irritation, unrest, pain and suffering, from physical derangement and mental depression, whenever the drug is even partially withdrawn, that very few have the stamina to quit.

The same is true of slaves to morphine, opium's most powerful alkaloid. It is a valuable remedy for many diseases, but so great is the danger of its creating a morbid desire that cannot be shaken off, it should be employed with the utmost caution and, except in very urgent cases, administered hypodermically only by a physician. Six months is often long enough to establish the habit so firmly as never to be broken, except by the most determined. The duration of a "morphine fiend's" career is one of constitutional peculiarity only; his ultimate physical, mental and moral ruin is sure.

Morphinism and alcoholism are in many respects alike, but in development they are different. Alcohol first attacks the digestive organs, then destroys the nervous system; morphine reverses this order.

Since the victim can hardly fail to be aware of the cause of his ills, and the habit can be treated successfully only in a sanitarium, or other institution specially equipped, space will not here be given to listing the disorders to which it gives birth, nor to detailing the steps essential to the cure. It will require the services of a physician and nurses most vigilant and faithful, and such long and thorough treatment as to fully destroy the appetite, for, otherwise, the patient will return to his indulgence when freed from restraint.

CHAPTER IX.

DISINFECTION AND DISINFECTANTS.

By JOSEPH T. LOVEWELL, Ph.D.

The object of disinfection is to remove or destroy that which will cause disease.

It is now well established that most forms of disease are caused by germs, or at least are associated with germs which live and multiply in the body, poisoning its blood and interfering generally with the functions of its organs. These microscopic forms of life occupy a borderland between animals and plants, and it was long difficult or impossible to determine to which they belonged. We call them microbes, small forms of life, a term applying equally to both kingdoms; animalcula and bacteria are names also often applied to them.

It must not be understood that all microbes are harmful to human life. They have their place in the economy of nature, and stand at the gateway where inorganic matter becomes organic, or where the process is reversed and the organized structure breaks down into simple elements or combinations, into which what we call animal life does not enter.

The great French chemist and physicist, Pasteur, has shown that all forms of fermentation are caused by bacteria, or little plants of which yeast is a most familiar example. Keep these germs out and fermentation does not ensue, and so we seal up our meats, fruits and vegetables, and preserve them from decay. Similar germs are associated with mold and fungus growths, and with everything known as putrefaction—the general breaking up of organic structures. The final products of this decay are principally carbonic acid and water, for all the protean forms of the organic world are built up from a very few elements of which carbon, hydrogen and oxygen are chief. As the processes of decay run their course the elements which enter in smaller proportions, such as sulphur and nitrogen, often form a great variety of intermediate products, some of which have very offensive odors and warn us against touch and taste.

On the other hand when elements are to be combined into organic matter, the work of the microbe is also utilized and is essential. For example, take nitrogen, which is needed as a constituent of many forms of animal and plant life; this element forms four-fifths of the atmosphere but will not enter into organic combinations until it has undergone nitrification—a combination with oxygen and hydrogen—and it is believed that this combination is always effected through the agency of microbes. It is not necessary to give here a full account of microscopic beings, nor is it possible, for bacteriology is comparatively a new science and its researches have extended but a little way. It is sufficient to be reminded of the mighty hosts which surround us, ready either to succor or to destroy. They will, sooner or later, bring our bodies back to the dust from which they came, but we prefer to run the full course of life and not to suffer a premature decay. Of the various diseases, such as small-pox, cholera, the yellow, typhoid, scarlet and malarial fevers, consumption, measles and diphtheria, which kill a large part of the human race, each one is caused by a microbe of special kind suited to its work. It is positively known that by proper agencies these microbes can be destroyed or danger from them in a large degree averted.

WHEN TO APPLY DISINFECTANTS.

The presence in any locality of a germ disease proves at once the need of disinfection, both to prevent the spread of the disease and to mitigate its effects. The first case of yellow fever, for example, is usually light and, as in this country the disease is not endemic, it is comparatively easy by isolation and disinfection to prevent it from spreading. The same is usually true of other infectious as well as contagious diseases. Hence the importance of prompt disinfectant measures. It is also proper to disinfect before any disease appears, provided the season, or the condition of the locality in respect to drainage, cleanliness, or proximity to infected places makes the precaution a prudent one.

PRINCIPLES OF DISINFECTION.

In the destruction of all forms of disease germs certain general principles apply: The first is the principle of dilution, nature's great remedy whereby the world is kept habitable for man. This is effected by movements of air and water, through which all

poisons lose their virulence and the death dealing microbe perishes from lack of that on which to feed.

Second. There is disinfection by changes in temperature. Some germs, as those of yellow fever, are killed by frost; others, and perhaps all, are rendered inert by freezing, but many of them become active again when the temperature is raised. It is obvious that on a large scale, low temperature is a matter of climate and that man sooner than microbes will succumb when deprived of heat. In cold storage we make a limited use of this principle in arresting decay. On the other hand when the temperature is raised we soon reach a point destructive to all forms of life with which we are acquainted. It is safe to say that no germ or living organism can long withstand the temperature of boiling water. There is large use made of this principle in disinfection. Garments and utensils which can be soaked in boiling water for half an hour will thereby be thoroughly disinfected, and hot steam is a most excellent agency for disinfecting rooms and cars.

Dry heat will disinfect, but it is generally less conveniently applied than hot water or steam and is so untrustworthy that it is now very little used. The extreme heat of combustion is resorted to when we are willing to sacrifice the infected articles in order to destroy the disease germs they contain. This is the common disposition of rubbish, and pest houses, with their infected furniture and clothing, are frequently best committed to the flames. The burning of old buildings in cities is often of enough sanitary advantage to pay for the simultaneous destruction of structures new and without fault. Cremation of the dead, for the sake of good sanitation, is supported by arguments that ought to find general acceptance.

Direct sunlight is a powerful disinfecting agency. The actinic rays are potent in effecting chemical action, and exposure to sun and air is often all that is needed to disinfect bedding, clothing and furniture; but mattresses, comforts and thick clothing are liable to become infected to a depth to which sunlight cannot penetrate, hence too much confidence must not be placed in this method.

CHEMICAL DISINFECTANTS.

We next consider the disinfectants of more special application. Many substances have been proposed as germicides and it should be remembered that they are all poisons, generally as destructive

to human as to germ life. A disinfectant may be in the solid, liquid or gaseous form, and that form should be chosen which is best adapted to the end in view. Then, too, there are deodorizers which may or may not be disinfectants; they act by forming with the odoriferous principle a substance which is odorless, or they destroy the odor by another which is more pungent. The latter class may be positive obstacles to the ends in view, for the sense of smell tells us what to avoid, and if this sense be cheated or overpowered we will lose a most important guard of health and safety.

Carbolic Acid is slow in its action but when it can have plenty of time is one of the most useful disinfectants. It is used in solutions, and their activity can be increased both by adding common salt and by using them hot. It is a deadly poison if swallowed, and it should not be applied extensively to the human body. If dissolved in alcohol, oil or glycerin, it loses most of its disinfecting power.

Crude Carbolic Acid is only slightly soluble in water, but hot water containing three per cent of soap dissolves five per cent of crude carbolic acid, and in this form is a valuable disinfectant.

Cresol.—The cresols are obtained from crude carbolic acid by distillation, and are only slightly soluble in pure water but, by adding neutral potash soap, water can be made to dissolve one-half its volume of cresol, thus forming lysol, which by the addition of water can be reduced to any strength desired, and for disinfecting purposes is preferable to carbolic acid solutions for the following reasons: It is cheaper, it is not quite as poisonous, and is better for disinfecting excreta and tuberculous sputa. It is excellent for washing floors and woodwork, and for disinfecting linen and cotton clothing soaked in it, but it is likely to injure the colors and the fabrics themselves.

Solutol is obtained by dissolving sixty per cent of cresol in water to which an alkali has been added. It is cheap, effective and well adapted to disinfecting large quantities of organic matter. For general use a half pint of the solution may be mixed with two or three gallons of water.

Tricresol and *Creolin* are other solutions of the cresols and, although less valuable than lysol and solutol, form the bulk of several patented compounds sold under high sounding names.

Corrosive Sublimate (bichloride of mercury) under favorable conditions is a quick and powerful disinfectant, but as it coagulates

albumen, and is decomposed by hydrogen sulphide and several other things, it is not adapted to disinfecting sputa or excreta. Its solutions must be prepared and kept in glass or earthenware, they will destroy metallic waste pipes, and they are very poisonous. It is excellent when used as a wash upon walls, floors, woodwork, furniture, upholstery and clothing; it is also a good disinfectant for the hands, face, hair and beard, but it should not be applied to a very large portion of the body at one time. It does not often injure the colors of fabrics and does the fabrics themselves no harm.

Lime.—When freshly slacked and diluted with water until it reaches the consistency of thin cream, lime is a good disinfectant for excreta, but it is slow and must be used in large quantities. Applied as whitewash it is good to disinfect walls. Air slacked lime has no value as a disinfectant.

Chloride of Lime.—This is one of the best disinfectants and may be used for the same purposes as lime, but to be trustworthy it should come from a reliable manufacturer, be kept in air-tight cans, the solutions be freshly prepared when used, and used in larger quantity than the bulk of the material to be disinfected.

Soap and Soda.—Hot soapsuds, and solutions of washing soda have some value as disinfectants. Hot lye, made from one part of fresh hardwood ashes and two parts of water, will effectually disinfect tuberculous sputa and discharges from the bowels.

Permanganate of potash, sulphate of copper (blue vitriol), sulphate of iron (copperas), sulphate of zinc, and chloride of zinc were formerly much used as disinfectants, but they are now known to have little disinfecting value and some of them are almost worthless.

Chlorine and bromine gases are efficient disinfectants for some purposes, but are very injurious to articles subjected to them and too disagreeable and dangerous to be recommended.

Sulphur.—Sulphur dioxide, made by burning sulphur at the rate of four pounds for every 1,000 cubic feet, with allowance for waste, is one of the agents longest in use for the fumigation of rooms. All doors, windows, flues and crevices must be tightly closed and the fumes allowed to act for at least twenty-four hours and abundant moisture, best as steam, must be present at the same time. Sulphur fumes are very poisonous, are injurious to many articles of furniture, are not very reliable as a disinfectant for

diphtheria and some other diseases, and the results are not as trustworthy as they ought to be.

Formaldehyde.—A new substitute, safer and more efficient than chlorine, bromine or sulphur, chemically known as formaldehyde ($\text{CH}^2 \text{O}$), has lately come into general use. It is usually prepared by burning wood alcohol (methyl alcohol) in a lamp designed for the purpose and so arranged that the flame comes in contact with red hot platinum, by which treatment the alcohol loses the elements of water and formaldehyde is the result—a gas of very peculiar and penetrating odor, but not as offensive or poisonous to man as sulphur fumes, and much more conveniently managed. When formaldehyde lamps are used, one and a half pints of wood alcohol to each 1,000 cubic feet should be changed into formaldehyde in one and a half hours. The room must be kept very tightly closed while the gas is being applied, all cracks, flues and openings having been thoroughly calked. Eight hours, one-third of the time required for sulphur dioxide, is sufficient to disinfect with formaldehyde and the result is more certain.

Formaldehyde may be dissolved in water, and a forty per cent solution of it is called *formalin*. By boiling formalin the formaldehyde is again set free, and this is generally the most convenient way of getting the gas, as well as the most reliable, since the lamps often fail to do their work. It can be passed into a room by a tube through a small aperture, as a keyhole, and thus very safely and quickly four per cent of the atmosphere within is changed to formaldehyde. One gallon of a forty per cent solution of formaldehyde will yield fifty cubic feet of the gas, an amount sufficient for a room of 1,250 cubic feet. If there is a probability of infectious sputum being dried upon the walls, floor or furniture, as often happens in cases of diphtheria, consumption, scarlet fever, and the like, the surfaces should be washed or sprayed with formalin diluted (Solution 7) before the gas is turned in.

DISINFECTING SOLUTIONS.

For these formulæ and details as to their application, together with other material used in the preparation of this department, we are indebted to investigations by the State Board of Health of Maine.

Solution 1. For clothing, woodwork, floors, leather, excreta in the sick-room, sputa, the hands, the person.

Solution 2. For the same general uses as Solution 1. It is

a little more efficient than Solution 1; but more likely to injure colors.

Solution 3. For tuberculous sputum, and discharges in the sick-room.

Solution 4. For excreta, privy vaults, cesspools, etc.

Solution 5. For the same purposes as Solution 4.

Solution 6. For clothing, the hands, and the surfaces of walls, floors, furniture, etc.

Solution 7. For clothing, the hands, etc.

SOLUTION 1.

Carbolic acid (pure liquefied), seven ounces;

Water, one gallon.

Mix. This is approximately a five per cent solution. Its power is somewhat increased by the addition of from twelve to fourteen ounces of common salt to each gallon when used for the disinfection of excreta, or for other uses where the salt is not objectionable. (See "Carbolic Acid.")

SOLUTION 2.

For the disinfection of clothing this solution mixed half and half with water will do.

Lysol, five ounces;

Water, one gallon.

Mix. This may be used as a substitute for Solution 1, one-half the strength sufficing for uncolored clothing. Many colors are changed by it.

SOLUTION 3.

Solutol (crude or pure), one-half pint;

Water, two or three gallons.

Mix. This is a very efficient disinfectant for excreta, tuberculous sputum, and gross disinfection generally. If to be used in dwelling houses or wherever the odor of the crude product would be offensive, pure solutol should be applied.

SOLUTION 4.

Chloride of lime, six ounces;

Water, one gallon.

Mix. This is about a three per cent solution. It decolorizes and destroys fabrics.

SOLUTION 5. "Milk of Lime."

Slake a quart of freshly burned lime in small pieces with three-fourths of a quart of water—or, to be exact, 60 parts of water by weight, with 100 of lime. A dry powder of slaked lime (hydrate of lime) results. Make milk of lime not long before it is to be used, by mixing one quart of this dry hydrate of lime with four quarts of water.

Air-slaked lime is worthless. The dry hydrate may be preserved for some time if it is inclosed in an air-tight container. Milk of lime should be freshly prepared, but may be kept a few days if closely stoppered.

SOLUTION 6.

Corrosive sublimate, one dram;

Water, one gallon.

Mix and dissolve. Label, "Poison!" This is approximately a 1 to 1,000 solution. One ounce of this solution contains very nearly half a grain of corrosive sublimate.

SOLUTION 7.

Solution of formaldehyde (formalin), six ounces;

Water, one gallon.

Mix. This mixture contains a little less than two per cent of formaldehyde.

WHAT DISINFECTANTS TO USE AND HOW TO USE THEM.

The disinfection of infected rooms and their contents cannot usually be well done with a single disinfecting agent or disinfecting process. Special disinfectants and special processes must be employed for special purposes. Thorough work, however, may be done even when the means at one's disposal are but few and simple, but the expense involved in washing paper from the walls of an infected room will often be more than the cost of an apparatus for using formaldehyde. In disinfection it should be remembered that success is influenced by:

1. *Temperature.* Disinfecting solutions generally act more efficiently when used warm or hot. A somewhat elevated temperature in the room increases also the activity of formaldehyde when used for its disinfection.

2. *Time.* This is an important element in disinfection. In

treating discharges in the sick-room, or tuberculous sputum, for instance, disinfectants should act several hours.

3. *Quantity.* The volume of the disinfectant used, as compared with that of the infectious material, is often much too small. Care should be taken to use enough.

To Protect Houses.—At the beginning and during the whole course of a case of an infectious disease, the family and the attendants on the sick should be under instructions, that as small a part of the house as possible shall become infected. Everything not absolutely needed in the sick-room should be removed from it before the patient is carried into it, or before they become infected. This applies particularly to carpets, draperies, upholstered furniture, and other things disinfected with difficulty. All the patient's bed and personal clothing should be disinfected as soon as it is removed. Every other article carried from the infected room should be disinfected then and there.

Rooms. In the disinfection of rooms it should be kept in mind that the chief task is the destruction of infectious dust. At every movement be on guard against the danger of whisking it into the air or diffusing it into other rooms. Before the disinfection of the rooms themselves is begun, there should be a primary sorting out. Some things, as the clothing and some or all of the bedding, should be removed for separate or special treatment. (See "Clothing," "Bedding," etc.)

In the disinfection of rooms formaldehyde is by far the most convenient agent. Properly used it can be trusted to disinfect the exposed surfaces of walls, floors, furniture, etc., and the infectious dust of the rooms. (See "Formaldehyde.")

If formaldehyde is not available the next best process is that of washing all surfaces with a disinfecting solution (Solutions 1, 2, 6 or 7). Floors, particularly, should receive careful treatment and the solution should wet all the dirt in the cracks. The ceiling must be brushed with a damp cloth to remove infectious dust and cobwebs. The walls should be wiped carefully with a sponge or cloth squeezed out frequently from the disinfecting solution. When the walls are papered, it will be a case of injured paper or incomplete disinfection. With a cloth dampened in the disinfecting solution wipe the dust carefully from all surfaces that can harbor it, as furniture, moldings, doors, windows, etc. (See "Furniture.")

Cotton and Linen Clothing.—The most trustworthy agency for the disinfection of clothing generally is moist heat—either steam or boiling. Steam disinfection wets the goods less than boiling, does not shrink woollens as much, and is less likely to change the colors of fabrics. This can be well done on a small scale in a common tin wash boiler by supporting a bottom of lath or a thin board above the water by two bricks, placing the infected articles in the chamber thus formed, covering them tightly and keeping the water boiling for an hour. Many kinds of clothing that would be injured by boiling can be disinfected in this way without injury. After the steaming, the boiler should be carried immediately to the open air and the clothing thrown over a line. It will not usually be very wet, and will soon dry if spread out in the open air, while hot. If the clothing be put into the water and boiled thirty minutes its thorough disinfection is equally sure.

When infected bed or body linen is removed, it may be treated differently according to circumstances. If stained, it should be soaked some hours in a disinfecting solution at a temperature not exceeding 120 degrees F. For this purpose Solution 2, half strength, is especially appropriate, having the properties of soap as well as of a disinfectant; or Solution 1 mixed with an equal quantity of soap and water may be used. Subsequent boiling, as in ordinary laundry processes, will complete the disinfection. Unstained clothing may be immersed in Solutions 1, 2, or 7, one-half strength, or in Solution 6, then treated as already advised; or it may be boiled immediately. If Solution 6 is used, the clothing should be well rinsed before it is transferred to the wash boiler, to avoid corroding the latter.

Clothing which has been wet is not readily penetrated by heat in steam disinfection. In transferring infected clothing from the sick-room, it should be wrapped in a sheet wet in a disinfecting solution, or simply in water if the disinfecting solution is not at hand. Infected clothing should never be sent to a public laundry.

Woolen Clothing.—Disinfect with steam when available; when not, in solutions as under "Cotton and Linen Clothing," or with large doses of formaldehyde. In a cask or box made air tight by pasting paper over it, calking, or some other device, clothing and other articles may be disinfected by pouring in

with them upon a cloth to absorb it, formalin, or a mixture of one part formalin, one part wood alcohol, and two parts water, and leaving the box sealed up in a warm place for twelve hours.

Bedding.—When steam disinfection is available, quilts, comforters, blankets, pillows, etc., should be treated by it, and mattresses also if the apparatus is large enough. In the absence of a steam disinfecter, even if the room is to be disinfected by formaldehyde, remove all bedding, excepting the mattresses, for steam disinfection in the wash boiler or in Solutions 1, 2, 6 or 7. If these articles are left in the room their disinfection with formaldehyde will be uncertain, so will the surfaces of furniture and floors covered by them. Disinfect pillows and feather beds with steam in the wash boiler, or with large doses of formaldehyde in small inclosures that are practically air tight, as the tight box or a small closet carefully calked.

Mattresses.—Leave mattresses upon the bedstead wholly exposed to formaldehyde when the room is being disinfected. If the mattresses have been soiled by the penetration of discharges, as sometimes happens in typhoid fever, burn them. The only safe alternative is the injection of large quantities of formaldehyde or formalin into their interiors while they are inclosed in a gas-tight covering. Mattresses of but little value should be burned. The contents of straw beds should be burned; the ticks may then be disinfected as for clothing.

If the room is not to be disinfected with formaldehyde the surfaces of valuable mattresses should be washed with a sponge or cloth squeezed out of Solutions 1, 2 or 6. The removal of large pieces of bedding should be through a window into the open air instead of through other rooms.

Furniture.—Simply leave all furniture in the room, with their parts well exposed to formaldehyde. If formaldehyde is not available, wash or wipe carefully every part of the surfaces with a soft sponge or cloth squeezed out of Solutions 1, 2 or 6. Solution 6 must not be used upon gilt or metallic articles.

Upholstery, the unfinished backs of furniture, cracks and places where dust has lodged, must be washed with special care. After this treatment upholstered furniture should be carried outdoors and exposed to direct sunshine several days. Pictures covered with glass may be rubbed with a damp cloth; those not thus covered should be wiped with a soft, dry cloth. The common

practice of purchasing furniture, especially upholstered furniture, at second-hand stores cannot be too strongly condemned. Surely no prudent person who understands the nature of infection and contagion, or the methods of their dissemination, can consent to take such articles into his home, without any knowledge of the place from which they came, and assume that they are not reeking with scarlet fever, diphtheria or other germs.

Rugs and Carpets.—Disinfect rugs with steam or formaldehyde the same as "Bedding." Fur rugs must not be steamed. (See "Furs.") If, unfortunately, a carpet was left upon the floor of a sick-room, it should be removed before the room is disinfected, and treated as follows: Disinfect with steam if the appliances are available, but if these are not obtainable, use formaldehyde as for "Bedding." If neither steam nor formaldehyde can be used, spray or sprinkle the carpet on both sides until thoroughly wet with Solutions 1, 6 or 7. The only other way is burning, and this is the best course for carpets and rugs of little value.

Furs, Skins, Etc.—These can be efficiently disinfected only by formaldehyde as for "Bedding," or by spraying or sprinkling very thoroughly with a disinfectant. Solution 6, or the tight box with formaldehyde, is best.

Boots, Shoes and Other Leathern Articles.—Wash in Solutions 1, 2, 3, or 6, or expose to formaldehyde.

Excreta.—In the sick-room the discharges from the bowels may be treated with any of the solutions herein given except Solutions 6 and 7.

Disinfecting solutions should act three or four hours, at least. A still longer time is better. The quantity used of 1, 2, or 3 should be at least twice the volume of the discharge; if 4 or 5 is used, the quantity should be much larger. The intimate mixture of the solution and the matter to be disinfected is important. A sure way to disinfect fresh excreta is to pour upon it in the vessel at least three or four times its volume of boiling water, then cover the vessel and let it stand until cool.

Privy Vaults.—Disinfect with Solution 4 or 5, used in large quantity, sufficient to thoroughly saturate the contents; after the vault is emptied pour in pailful after pailful of the milk of lime until the ground beneath the privy is completely saturated with it. Cesspools should be disinfected in the same way.

Water Closets.—If they have received infectious excreta, the bowls of water closets should be scrubbed out with Solutions 1, 2, or 3.

Sputa.—Fresh tuberculous sputum is hard to disinfect. It may be received on pieces of cloth or paper and burned. In spittoons it may be disinfected with Solutions 2, 3, or 1. The efficiency of these solutions is increased by using them hot, and Solution 1 is made still more effective by adding to each gallon two ounces of hydrochloric acid, or twelve to fourteen ounces of common salt. These solutions should act twenty-four hours—necessitating several spittoons for the patient.

Tuberculous sputum may also be disinfected by filling the spittoon with boiling water, covering it and letting it stand until cold. The cleansing of the spittoon will be facilitated by adding washing soda before the hot water is poured in. Other infectious sputa should be treated the same as tuberculous sputum.

Corpses.—Wrap in a sheet wet in Solutions 6, 7, or 2, and bury as soon as possible.

Mouth and Throat of the Attendant.—As a preventive, rinse them in a solution of five drops of formalin to one ounce of water.

Clothing of Nurses and Physicians.—Steam is preferable, or the suit may be put into a tin wash boiler, or gas-tight box, and a rag, wet with two or three ounces of formalin, placed beside it, then the box closed tightly and left during the night. The clothing must not be worn again until thoroughly aired.

HOW TO MAKE THE HOME HEALTHY.

Make large provision for the free circulation of air and the admission of sunlight, insure good drainage, and see to it that there are no stagnant pools and sewage accumulations. Burn all combustible debris, clean out ditches and allow no vegetation to grow in them. Vaults and cesspools must be frequently emptied, and the contents removed far from buildings and covered with earth, and during the cleansing such places should be liberally treated with Solution 4 or 5, and with dry earth. As ordinarily arranged, the cesspool is an abomination that should not be tolerated, for it places corruptible matter in the best condition for the long-continued generation of microbes, from which to infect the air and water of the neighborhood. Where sewer connections are impossible, let drainage from the kitchen sink be conducted to

some distance from the house, through a movable pipe, and discharged upon the surface of ground exposed to the sun, and where no vegetation is allowed to grow; move the pipe so that it shall discharge in a fresh place each week, and as the ground that has been soaked becomes partially dried treat it liberally with Solutions 3, 4, or 5. The disposition for any considerable time, of such matter, by seepage from underground pipes, is likely to prove a delusion and a snare. Do not attempt it.

In cleaning buildings, secure if possible a free circulation of air under them; especially see to it that there are no damp, moldy rooms; bring out and burn all decaying rubbish found in attic or cellar, and with freshly slaked lime whitewash the cellar and attic walls.

PATENT DISINFECTANTS.

Many inventors have tried their hands at mixing disinfecting compounds, and to their nostrums have given fanciful names to catch the popular ear and secure their sale. It is doubtful if any of them possess any real advantages; many of them are absolutely worthless. Because a substance emits a powerful odor is no proof that it is a disinfectant; on the other hand, those compounds that have a pleasing smell seldom have any disinfecting properties, and, by creating a mistaken idea of security, may do more harm than good. To secure reliable results we must first know what we want to do, then how to do it; and we can never be sure of accomplishing what we wish with patent compounds whose compositions are kept secret.

MATERIA MEDICA.

By LOUIS C. DUNCAN, M.D.

INTRODUCTION.

Materia medica is the science of the materials used in treating the sick. It includes not only drugs, but also foods, air, water, electricity, and serums, besides agents not describable in a brief chapter. With the exception of water, only those remedies known as drugs will be considered here. They are vegetable, mineral and animal in origin, and are prepared in the forms of pills, tablets, solutions, tinctures, extracts, etc.

A solution is either a solid or gas transformed to the liquid state through the agency of a liquid which is called the solvent. When the solvent will dissolve no more of a substance, the solution is called a saturated solution of that substance.

A mixture is a fluid containing some drug not dissolved, but held suspended in it.

An emulsion is a milk-like mixture, usually prepared by mixing an oil and an alkaline or mucilaginous fluid.

A decoction is a solution made by boiling.

An infusion is a solution made by steeping in water.

An extract is prepared by evaporation of the juice of a plant almost to dryness.

A tincture is prepared by dissolving an extract in alcohol. An extract is stronger than a tincture.

A trochee or lozenge is a button-shaped mass of drug, intended to be dissolved in the mouth.

A tablet is like a trochee, but smaller, and is to be swallowed.

Tablets are generally to be preferred to the hard-coated pills, since they dissolve more readily in the stomach, but, on the other hand, they lose strength more rapidly with age.

"It may be startling to the uninitiated, but it is nevertheless true, that from among the fiercest poisons come some of the most valuable medicines. A knife of very keen edge, when used with a light and dexterous hand, will make a cleaner and better wound

than the blunter instrument which has to be pressed heavily on the part; and so a remedy of greatest power, when skillfully timed and apportioned to the varying progress of the case, is often safer and more valuable, under urgent and dangerous circumstances, than the "simples" of the timid practitioner. A few small doses of the one may turn the current of disease, and save a precious life, where the large and sustained doses of the other would prove unavailing. Prussic acid, aconite, strychnia, arsenic, opium and belladonna are at once intense poisons and admirable medicines in the hands of the skillful," but, it can hardly be necessary to add, as domestic remedies they have little place. They are mentioned here, not to encourage their use in home treatment, but to inform the layman as to some of the weapons employed by masters in the healing art, and, that, apprised of their true character and the effects they may be expected to produce, he may more fully realize the importance of using them exactly as prescribed.

GENERAL TONICS.

A Tonic is a remedy that increases the strength, and gives vigor of action to the system.

Cod Liver Oil.—Cod liver oil is one of the best tonics to restore and build up the system in all wasting diseases. Not only is it indicated in consumption, but in a large number of other diseases, such as marasmus of infants, rickets, nervous exhaustion, chronic bronchitis, scrofula, rheumatoid arthritis, and anemia. It is best given pure, and, owing to its nauseous taste, should be given in a single, large dose once a day. Many cannot take it pure, and for such an emulsion must be made. One of the most palatable is an egg emulsion put up by Parke, Davis & Co. Not many can digest more than three teaspoonfuls of the pure oil per day. It should be taken for weeks at a time.

Iron.—While iron is a general tonic, its special action is upon the blood. It increases the number of red blood corpuscles, as well as the amount of hemaglobin. It is indicated in all affections that weaken the blood; as anemia, chlorosis, leucemia, tuberculosis, diabetes, rheumatoid arthritis, cancer, and Bright's disease, also in neuralgia and erysipelas.

The old preparation, tincture of chloride of iron, still holds its place as one of the best. It should be given in doses of five to fifteen drops, well diluted, and kept from the teeth as much as

possible. There are modern preparations which are more palatable. "Pepto-mangan" is as good as any of them. They all have a constipating effect, and for that reason should not be given long without interruption. They are best taken after meals. Taken in large doses iron is likely to disorder the stomach.

Arsenic.—Arsenic, in small doses, strengthens the action of the stomach and is a general tonic. It also has a special effect upon the skin, and is said to clear the complexion. It improves the breathing or "wind." When too long continued it irritates the stomach and produces a puffiness under the eyes which is a danger signal. Arsenic is useful in all debilitating diseases. It will give good results in the beginning of tuberculosis, anemia, malaria, diabetes, nervous exhaustion, chlorosis and other diseases of the same weakening nature. It is also useful in all chronic skin diseases. It is the principal ingredient of the various "cancer pastes" of the quack cancer doctors, and enters also into a composition used very generally by dentists to destroy the nerves of teeth.

Fowler's solution of arsenic is the safest as well as the most convenient form. The dose should begin at five drops once in six hours, and gradually increase to twenty or thirty. The eyelids must be very closely watched, and if they begin to puff, the arsenic must be stopped for a while.

Quinine.—In small doses, quinine is a very valuable general tonic. For this purpose from six to ten grains per day should be given. The compound tincture of cinchona may be used instead, in doses of from one to four drams, three times a day. The taste may be disguised by taking it in quinal, or yerba santa syrup, or it may be taken in lozenges or in capsules.

Bitters.—Of the various bitter tonics used to stimulate the stomach, promote the appetite and better the general health, the chief ones are columbo, dogwood, quassia and gentian. The dose of each is from one-half to two drams. Nux vomica tincture, in five drop doses, and strychnia, one-sixtieth of a grain, may be included in this list. Iron, quinine and strychnia are now combined in an elixir which is regarded as quite generally useful. Let it be remembered, however, that loss of appetite and nausea are often nature's agents for calling a halt that the stomach, liver and other over-worked organs may have needed rest, and that at such times far more harm than good may result by overcoming these protests by bitters, or tonics of any kind.

Mercury, in small doses, is said to be a tonic. For this purpose, calomel, in one-fourth grain doses, three times a day, is the safest form.

Phosphorus and the hypophosphites are useful in all cases of nervous exhaustion. The dose of phosphorus is one-hundredth of a grain in a pill; but of the syrup of hypophosphite from one dram to one ounce may be taken.

HEART STIMULANTS.

Strychnia.—*Strychnia sulphate* is a white crystalline powder having an intensely bitter taste. The dose is from one-sixtieth to one-thirtieth of a grain. *Strychnia* stimulates both the heart and lungs, raises the body temperature, increases the muscular powers and renders the special senses more acute. *Strychnia* is useful in cases of paralysis, constipation, chronic bronchitis, beginning consumption, anemia, etc. It is an active poison, and an antidote to poisoning by chloral or chloroform.

Nitro Glycerin is a colorless, oily liquid, soluble in alcohol or ether. It explodes if heated in a closed vessel, or subjected to percussion. It is also known as glonoin and trinitrin. Its action on different persons differs so widely, it is difficult to say what the dose is. It varies from one to fifty drops of a one per cent solution. It causes the heart to beat both more rapidly and more forcibly, and, at the same time, lessens arterial tension, thus lessening the work of the heart. It is a remedy which can be used safely only by a physician.

Digitalis.—The tincture of *digitalis* is prepared from the leaves of the wild fox-glove. It causes the heart to beat more slowly and more forcibly, but also narrows the caliber of the arteries, thus giving it more work to perform. The dose is from one to ten drops. Patients who have been taking *digitalis* should not rise from the recumbent posture suddenly. It is one of the best diuretics known. Its principal use is in diseases of the heart, for which it is used extensively. It must be remembered that it is a dangerous poison, and be employed very cautiously.

Caffeine.—The citrate of *caffeine* is a white crystalline powder obtained from the ordinary coffee berry. The usual dose is five grains. Its most important action is to stimulate the heart and circulation. Its action on the heart resembles that of *digitalis*, causing the heart to beat more slowly and forcibly. At first it

produces a drowsy feeling, and later stimulates the brain. It is an effective remedy for that particular form of headache which is associated with disturbance of the stomach and known as nervous or sick-headache. It is also useful in dropsy.

Alcoholics.—While alcohol in quantity is a narcotic, in small doses (and it is never given medicinally except in small doses), it is a stimulant. It increases the action of the heart and the circulation, causes a slight rise in temperature, produces a feeling of exhilaration, and aids digestion. An overdose produces almost the exact opposite of these conditions, and the evil effects of prolonged indulgence, in quantities above the medicinal dose, are well known. The dose may be placed at from one to two ounces of whisky or brandy, which contains nearly fifty per cent of pure alcohol. Of the wines and lighter preparations more may be taken.

Alcoholics are useful, in fact almost indispensable, in many conditions, such as the very low stages of any disease, convalescence, prolonged wasting diseases, severe hemorrhage or injury, the bite of a poisonous serpent, and poisoning by agents which depress the heart. Alcohol is also an antiseptic, useful externally in washes and liniments.

ALCOHOLIC STRENGTH OF LIQUORS.

Alcohol	50 to 99%
Rectified Spirit	85%
Proof Spirit	50%
Whisky	44 to 50%
Brandy	39 to 47%
Rum and Gin	42%
Port Wine	30 to 40%
Sherry Wine	25 to 30%
Light red wines—Claret, Red Rhine, Concord, etc...	5 to 7%
Dry acid Wines—Rhine, Moselle, Ohio, etc.....	5 to 7%
Sparkling wines—Champagne, Hock, Catawba, etc...	8 to 12%
Sweet wines—Burgundy, Tokay, Madeira, Angelica...	6 to 7%
Beer, Ale and Porter	2 to 6%
Koumiss	1 to 3 per cent.

ANTIPYRETICS.

Antipyretics are remedies which reduce the temperature of the body; in other words, lessen fever. As a rule, they have no effect on a normal temperature. Some act by abstracting the

heat from the body; others by lessening the production of heat by slowing the heart and diminishing the processes of the body; and others by removing the elements which produce the excessive heat, as quinine given in malarial fever. Those of the last class are usually the best, but the others are sometimes necessary.

Water.—Water is one of the safest and best of antipyretics. For reducing fever it may be used as a bath, or for sponging the body. As a rule it may be drunk freely. The bath may either be cold (40 to 60 degrees F.), temperate (60 to 85 degrees F.), or tepid (85 to 95 degrees F.). When a physician is not at hand the tepid or temperate bath is safest. If the patient cannot be placed in a tub, the wet pack may be used. A linen sheet is wrung from cold water, the patient placed in the middle of it, and both sides folded over him, and he is then covered with blankets. The length of time that he should remain in the pack is from fifteen minutes to one hour, and when removed, he must be well rubbed with dry towels. If there is objection to the pack, sponging may be substituted. The face and neck are first sponged, then the arms, and so on until the whole body has been treated. Though not as efficient as the tub bath or pack, sponging also makes the patient feel more comfortable and cool, and reduces the temperature quite appreciably, and by many physicians is preferred to either of the other methods, as being more convenient, shocking the patient less, and involving less risk, and by repetition giving quite as good results (through opening the pores of the skin and by the cold produced by evaporation). It is a rule, followed by many, in continued fevers to give the bath or spongings whenever the temperature goes above 103 degrees, and as often as may be necessary to keep it below that point. There is no doubt that such measures are more certain and safe than all the fever drops, antipyrins and antifebrins that have ever been devised. The old notion that fever patients should not be allowed to drink cold water freely has given way to more humane and sensible ideas.

Quinine.—Quinia bisulphate is, after water, the most successful antipyretic. Though it has the most marked effect in the fevers called malarial, it is useful in nearly all fevers. It acts as an antiseptic in the fluids of the body, and has a specially fatal effect upon the germ of malarial fever, and for this fever is an absolute cure. That there are rare exceptions does not disprove the rule. For this, as well as for other fevers, large doses are required.

Thirty grains a day usually suffice for an adult, but in cases of pernicious malaria, and the so-called congestive chill, larger doses may be given up to sixty grains in twenty-four hours. It should be divided into six equal parts and one taken every four hours. The deafness that sometimes follows heroic doses is seldom permanent.

Quinine is also destructive of other disease germs. In blood poisoning, erysipelas and childbed fever quinine is extremely useful. It has an important place in the treatment of cerebro-spinal meningitis, measles, scarlet fever and pneumonia. A large dose at the beginning will often "break up" a cold, or even a case of pneumonia or pleurisy. In typhoid and typhus it has little effect.

Quinine should be given in the natural state or in capsules when possible. If the taste is to be disguised, it may be given in some of the preparations now in vogue; such as yerba santa, yerbazine, quimel, etc., or the chocolate lozenges may be given. The hard coated pills and tablets cannot be recommended. Quinine bisulphate does not differ materially from the sulphate commonly used.

Antipyrin, Phenacetin and Acetanilide.—These three modern drugs are much alike in their derivation, properties and effects. They are white powders, and are made from coal tar. The dose of each is from three to ten grains. Antipyrin is the most efficient as an antipyretic. By a full dose the temperature in fever may be reduced one or two degrees, or even to sub-normal, the decline beginning in ten to fifteen minutes, and lasting from two to ten hours. Besides reducing fever, they have a quieting effect upon the nervous system, and lessen pain in any part of the body, but care must be exercised in their use because of their depressing influence upon the heart. Phenacetin is the safest of the group, and antipyrin stands next. The preparation in tablet form known as acetanilide compound is generally useful in slight fevers, neuralgia, headache, rheumatism, etc., and is comparatively safe, for the acetanilide is here combined with caffeine, which, being a heart stimulant, counteracts its possible depressing effects. One tablet contains three grains and is a dose. Antipyrin is the best known drug for the reduction of fever, but, unfortunately, it has no effect on the cause of the fever; therein lies its inferiority to quinine. Acetanilide is sometimes called antifebrin. Antipyrin with salicy-

late of soda is effective in relieving rheumatic pains. Most headache tablets contain one of these drugs.

Aconite.—The tincture of aconite is prepared from the root of *aconitum napellus* or monkshood. The dose is from one-half to five drops. Although it has other powerful effects, its principal use is as a heat reducer. It is much employed by homeopathic practitioners (although its action is in direct opposition to their great principle of “*similia, etc.*”), because a very small quantity will produce a very marked effect. It slows both the heart and the respiration, reduces arterial tension, lowers the temperature, induces muscular weakness and lessens the nervous sensibilities.

In large doses, or rather, in what of other drugs might be called a small dose, it is an active poison and for this reason is a drug not suitable to be used as a home remedy. It is useful in slight fevers, bronchitis, pneumonia, pleuritis, scarletina, erysipelas, acute rheumatism and neuralgia. It should not be given in continued fevers, as typhoid, and is of no real advantage in malarial fevers. It should never be given to a very weak patient.

ANTISEPTICS.

Antiseptics may be defined as agents which arrest the action of germs. They are useful in many internal diseases resulting from germ action, as stomach disturbances, diarrhea, dysentery, and typhoid. Many of the modern antiseptics are derived from coal tar by distillation.

Carbolic Acid is a coal tar product, and one of the most powerful antiseptics. It occurs in white crystals, but that sold in the drug stores is a watery solution which, if nearly pure, crystallizes again in moderate cold. The dose is from one-fourth to one grain, or from one-half to two drops, well diluted. It is useful in vomiting, fermentation in the stomach or intestines, cholera infantum and cholera morbus. For internal use, creosote and guaiacol are preferable. Weak solutions of carbolic acid are much used as external antiseptics.

Creosote resembles carbolic acid, but is derived from wood tar. The best creosote is made from beech wood. It may be used in place of carbolic acid in the diseases mentioned. The dose is from two to five drops.

Guaiacol is similar to creosote, and the same dose may be

given, and either may be given in cod liver oil, brandy or whisky. Both have a peculiarly destructive action on the germs of tuberculosis and for that reason are much given in cases of consumption, and with good results.

Salicylic Acid occurs in small white crystals. The dose is from ten grains to one dram. Large doses disturb the stomach. Salicylic acid arrests fermentation, lowers the body temperature, and is useful in diarrhea and typhoid. Its special use is in acute articular rheumatism, commonly known as inflammatory rheumatism. Powdered salicylic acid makes an excellent dusting powder for ulcers, eczemas, etc.

Salicylate of Sodium is much like salicylic acid but is even more effective. For acute rheumatism it comes very near to being a certain cure. It is also useful in chronic rheumatism, muscular rheumatism, neuralgia, lumbago and gout. In all these affections it may be given conjointly with antipyrin. The dose is from ten to thirty grains.

Salol.—Salol is made by combining sixty parts of salicylic acid with forty parts of carbolic acid, and is, perhaps, the best antiseptic for internal use. It is a white powder, tasteless and insoluble in water. The dose is from five to thirty grains. When large doses are given continuously there is danger of carbolic acid poisoning. It is useful in all fermentations in the stomach and intestines, in all suppurative processes, in acute tonsillitis, rheumatism, neuralgia, la grippe, and typhoid. It is one of the best agents known for rendering the urine antiseptic in diseases of the bladder, prostate and urethra.

Boric Acid, or boracic acid, as it is sometimes called, is a mild antiseptic. Its principal use is external, for mild eye washes, and as a dusting powder. A four per cent solution, which is a saturated solution of this acid if the water is cold, is an excellent mild antiseptic wash for general use. Powdered boric acid may be used on all kinds of ulcers, burns, scalds, and external wounds.

Borax, or the borate of sodium, has much the same properties as boric acid.

Bismuth Subnitrate is a grayish white powder of mild antiseptic power. It may be given with much benefit in simple inflammations of any part of the gastro-intestinal tract; it gives relief in each, whether it be the stomach, small intestines or colon. It has usually been given in too small doses. To obtain the desired

result, from one-half to one dram should be given every three or four hours. As bismuth is not a poison, very large doses may be given. It is also useful externally in cases of sore mouth, ulcers, burns, etc.

The list of diseases benefited by bismuth is a long one, including acute indigestion, inflammation of the stomach, ulcer and cancer of the stomach, summer diarrhea and cholera infantum, vomiting, diarrhea of typhoid, chronic diarrhea, diarrhea of consumption, and some cases of stomach neuralgia. It is best given in milk, and on an empty stomach. It colors the stools dark, and sometimes produces constipation. Bismuth subgallate, or dermatol, has much the same action, and is, perhaps, superior for external use.

Menthol occurs as colorless crystals derived from the oil of peppermint. It is frequently put up in the form of a cone, stick or pencil for external use. It is also used in washes, sprays and gargles, and seems especially beneficial in the affections of the throat. It is useful in neuralgia of the face, certain headaches and toothache. In cases of neuralgia the solid stick is rubbed over the surface until the skin reddens.

Hydrogen Peroxide is a clear fluid, and an excellent external antiseptic and deodorant. Its especial use is in suppurating cavities, or on surfaces, which it cleans more effectively than any other agent. It seems to have an affinity for pus, and, when they come in contact, unites with it to form a sort of foam which is easily washed away. It may be diluted or used full strength. It should be kept in an amber bottle in a dark place, and well corked, as it loses strength on exposure.

Bichloride of Mercury.—This is the most powerful of all antiseptics. It should never be taken internally, except on prescription by a physician. For external antiseptic purposes, solutions are made varying in strength from one to fifteen grains to the pint of water. For application to the body a stronger than a two grain solution should not be used. For general disinfecting purposes, destroying vermin on beds, etc., a fifteen grain solution may be used. It should always be borne in mind that the bichloride is a deadly poison.

Chlorinated Lime is a grayish white substance, occurring in powder or lumps. It is useful for disinfecting excreta, vaults, etc., for which it is vastly superior to the quick lime often used.

Charcoal.—Ordinary charcoal is a useful antiseptic and deodorant. It acts by absorbing poisonous substances. When used in filters it must be renewed occasionally. Powdered charcoal may be given internally in doses up to a dram.

Permanganate of Potash, occurs in deep purple crystals. Its solution may range in color from a light rose to a deep purple, depending on the strength. One to two grains may be given internally. It may be administered whenever an internal antiseptic is needed, but its principal use is in solutions for washing out cavities, cleansing foul ulcers, etc. It has recently been learned that the permanganate of potash is an antidote for morphine poisoning; a grain of the potash neutralizing a grain of the morphine. When injected into the part bitten by a poisonous serpent the action of the poison is arrested.

Iodoform is a yellow powder having a very pronounced and disagreeable odor. It has long been the favorite powder for dusting burns, abrasions, closed wounds, etc., but it is giving way to other preparations more efficient and elegant. For this purpose boric acid, bismuth, quinine, acetanilide, salicylic acid, soda, or one of several other powders may usually be substituted.

Tincture of Iodine.—The tincture of iodine is a brown-colored liquid, having a more important place in the list of home remedies than in the practice of the physician. It stains the skin a dull yellow and acts as an irritant. Painted over swollen glands and local inflammations, before the formation of pus, it will sometimes prevent that condition. It also hastens the absorption of fluids, and for this reason is painted on the chest in cases of pleurisy with effusion, and on inflamed joints containing fluid. It is also injected into goiter, enlarged tonsils, and glandular growths about the neck.

Ichthyol is another of the new remedies, derived from coal tar. It is a dark, semifluid substance having the odor of bitumen. It may be used in most cases where iodine has heretofore been used, and is decidedly superior to that drug. It dissolves in water, ether or alcohol, and mixes readily with vaseline, lard and oils to make ointments. For reducing the inflammation and relieving the pain of sties, boils, felons, carbuncles, and similar affections, it has no equal. For this purpose it should be dissolved in three times its bulk of alcohol and ether, and this preparation painted on the inflamed part every hour, or as often as may be necessary to relieve pain.

Zinc Sulphate is a white crystalline substance, used in solution and mostly externally. Solutions varying from one to six grains to the ounce are used. Given internally, in doses of from one-half to one dram, it is an active emetic.

EMETICS.

Emetics are medicines which cause vomiting. The prompt use of an emetic is often necessary to free the stomach of poison, or other objectionable materials, and sometimes greatly relieves headache, hysteria, convulsions in children, and other troubles, when the cause is a disordered stomach. They may also be valuable agents in the removal of obstructions from the throat or wind-pipe.

Warm Water, when taken in large quantities, is usually an efficient emetic, especially if vomiting has already begun; and copious draughts of it materially aid the action of other emetics.

Mustard is a safe emetic, and one which is at hand in almost every home. Besides being an emetic it is also a stimulant. One or two teaspoonfuls of powdered mustard, stirred into a cup of warm water and taken warm, is usually sufficient.

Alum.—Powdered alum is another common drug which may be used as an emetic. It is slow but safe and reliable. Vomiting does not occur for a half-hour after it has been taken. It is especially recommended for croup and diphtheria, as an aid in the removal of the false membrane, and to prevent the formation of a second one. The dose is a teaspoonful. It may be taken in syrup, and should be repeated every forty minutes until there is free vomiting.

Squill or Scilla.—The compound syrup of squill, or “hive syrup,” is another active emetic, but its action is partly due to the tartar emetic which it contains. The dose is from five drops to a teaspoonful. It is not as safe as some other emetics.

Ipecac is an efficient and safe emetic for all ordinary purposes. The time required for its action is from twenty to thirty minutes. It produces no depression or bad after effects, and, in weak conditions, is safer than the mineral emetics. The dose is from five to sixty grains of the powdered root.

Sulphate of Copper, or blue vitriol, is a prompt emetic, acting in a few minutes. It is useful in many cases of poisoning, especially in phosphoric poisoning. From five to ten grains may be given, dissolved in a few ounces of water.

Sulphate of Zinc, or white vitriol, is also an emetic, similar in its action to the sulphate of copper, but is said to be less irritating to the stomach, and not as powerful. A half-teaspoonful of the sulphate should be given, dissolved in water. The action of this, as of most emetics, is aided by drinking freely of lukewarm water.

Tartar Emetic is a tartrate of antimony and potassium. It is a powerful emetic, but depressing, and its use as a home remedy is attended with danger. A good way to give it is to dissolve five grains in a half-teacup of water, and give a tablespoonful of the solution every fifteen minutes until vomiting is produced.

Apomorphine is one of the quickest and most effective of all the emetics. Usually not more than ten minutes elapse after taking until vomiting begins. The dose, when taken into the stomach, is one-eighth of a grain. It is most commonly given by means of the hypodermic syringe, the dose then required being one-sixteenth of a grain. It produces free and easy vomiting with but little nausea.

DIURETICS.

Diuretics are remedies which increase the flow of urine, either by stimulating the kidneys, or otherwise. The principal diuretics in use are water, sweet spirits of niter, digitalis, the acetate and the citrate of potash, oil of turpentine, copaiba, cubebs, buchu and squills.

Water.—Water is, perhaps, the safest and best of all the diuretics for general use. To act as a diuretic it must be drunk in quite large quantities. It works in a purely mechanical way, washing out and cleansing the kidneys. There are cases, however, where instead of relieving it adds to the difficulty. Milk, too, is diuretic in its action and at times is preferable to water, not only acting on the kidneys but also nourishing the patient.

Sweet Spirits of Niter, or the nitrous spirits of ether, is a well known home remedy, but none the less effective on that account. It is a clear, sweet liquid, pleasant to take, and usually productive of the desired effect. The dose is from a half-dram to a half-ounce. It should not be kept long, as it rapidly deteriorates.

Digitalis has been described under the head of "Heart Stimulants." It is especially useful in dropsies, but must be used with great care.

Potash Salts.—The acetate, citrate and bitartrate of potash

are all excellent diuretics. From five to twenty grains may be given, well diluted, three times a day. Large doses often disturb the stomach. They are useful for keeping the urine alkaline, and in many cases of Bright's disease, and in valvular disease of the heart.

Oil of Turpentine is a popular household remedy, and justly so. The dose should not be over thirty drops. Taken internally, in proper dose, it acts as a diuretic, but in large doses it produces scanty, bloody urine, with a frequent desire to urinate, pain and straining. In medicinal doses, it also stimulates the heart and circulation, and acts as an antiseptic in the stomach and intestines. It dries up discharges from the lungs, and from the bladder and urethra also. When applied externally over the kidneys, it has a slight diuretic effect, and often will relieve pain in the kidneys. It is a good counter irritant, and enters into the composition of many liniments. The steam from heated turpentine and water may be used in cases of croup, etc.

Balsam of Copaiba is a diuretic, principally used for its healing effect upon inflamed mucous membranes of the urethra and bladder. The dose is from ten drops to a teaspoonful, but large doses may produce indigestion. It is nauseous and very difficult to take. It has been much used in venereal diseases.

Buchu and Cubebs are two vegetable preparations much used in patent nostrums. Neither is of much value. Cubebs have the same uses as copaiba but are not as effective.

Squills is one of the old time remedies, now becoming obsolete. The dose is from one-half to one dram. It is used as an expectorant in many cough mixtures, and as a diuretic. It is irritant to the stomach, and when an overdose is given produces vomiting. It should never be given when there is any disturbance of the stomach, nor to young babies in any case. It is effective as a diuretic, but an overdose produces inflammation, straining and bloody urine or suppression of the urine.

CATHARTICS.

Cathartics are medicines that promote intestinal discharges, and thus cleanse the stomach and bowels. They may be divided into several classes on the basis of their efficiency and rapidity of action: Thus we have laxatives or aperients, purgatives and cholagogues.

Laxatives or Aperients are those remedies which excite only slight peristalsis, cause no irritation or pain, and produce softened stools in ten to twelve hours.

Sulphurdose, one to three drams.
 Ox galldose, two to four grains.
 Cascara, fluid extract.....dose, fifteen to forty drops.

Purge comes from two Latin words meaning to make pure, and *purgatives* are medicines having the power to cleanse the bowels. They are more severe and thorough than laxatives, and are of three principal classes: Simple, saline and drastic.

The Simple Purgatives increase peristaltic action, and stimulate the secretions of the intestinal glands, cause more copious discharges than the laxatives, and some irritation and griping. They operate in eight to ten hours, and produce one or more watery stools. The following are of this class:

Castor oil.....dose, one to eight drams.
 Senna, fluid extractdose, one-half ounce.
 Rhubarbdose, one-half to two drams.
 Aloesdose, one to five grains.

Castor Oil is a very reliable laxative, causes little irritation, pain or straining, and produces copious stools. It is an especially valuable laxative for children and pregnant women. In children's diarrhea caused by undigested food or irritating secretions, there is no better remedy. It has very little effect upon the liver. It may be easily taken in a half-cup of hot coffee or hot milk, and its offensive taste may be disguised by a few drops of wintergreen oil.

Saline Purgatives are such salts as have the power to increase peristalsis, and to cause large secretions of fluid from the mucous membrane of the bowels, thus causing free watery stools in from six to eight hours. They include such medicines as

Magnesia sulph., or Epsom salts..dose, one to eight drams.
 Magnesium citratedose, one to four drams.
 Rochelle saltsdose, one to eight drams.
 Seidlitz powders.

The Drastic Purgatives are medicines which act still more intensely than the salines. They operate powerfully and quickly,

producing violent peristalsis, griping and straining, and copious watery stools, in from two to six hours. In large doses they are dangerous, causing inflammation and symptoms of irritant poisoning. The following are of this class:

Jalap, comp. powderdose, ten to sixty grains.
 Scammony, comp. powderdose, five to ten grains.
 Colocynth, comp. powderdose, five to ten grains.
 Compound cathartic pillsdose, one to three.

Cholagogues are medicines which are supposed to act upon the liver and cause flow of bile into the intestines. In about eight hours they produce free purging of watery stools of greenish color. The leading cholagogues are:

Calomeldose, one-tenth to ten grains.
 Podophyllum resindose, one-fourth to one grain.
 Aloesdose, one to five grains.

Mercurial Purgatives increase glandular action, and empty the ducts of the liver. Their action is slow, producing several stools in from ten to twenty hours. In large doses they produce griping.

Calomeldose, one-tenth to ten grains.
 Blue Massdose, five to fifteen grains.

Hydragogues are medicines supposed to be able to expel serum that has been effused into any part of the body. The cathartics of this class produce violent purging with watery stools.

Gambogenot prescribed alone.
 Elateriumdose, one-sixteenth to one-fourth grain.
 Croton oildose, one to two drops.

In large doses these are dangerous. The salines are also hydragogue cathartics.

WHAT CATHARTICS TO TAKE AND HOW TO TAKE THEM.

Small doses of calomel, as one-tenth of a grain repeated every thirty to sixty minutes until a grain or more has been taken, give better results than large doses at longer intervals. In case thorough action is not obtained, follow in eight or ten hours with castor oil, or one of the salines.

The best and safest cathartics, as general domestic remedies,

are castor oil, magnesia sulphate, Rochelle salts, calomel and podophyllum. For chronic constipation cascara is a good remedy. It may be combined with aloes, strychnia and nux vomica, for, although the last two drugs are not cathartics, they stimulate peristalsis of the bowels and thus counteract constipation. It must be remembered that the last two are poisons, and are to be used only in very small quantities. (See "Poisons").

The too common habit of taking cathartics immediately upon the appearance of each and every disorder is most pernicious. These medicines are excellent in their places, but in cases of indigestion and constipation resort to drugs should be made only when a thorough trial of laxative diet, regular habits, pure air, both day and night, and outdoor exercise, have failed to overcome the disorder. A rectal injection also sometimes brings great relief in these cases, and must be counted among the valuable remedies, but, like drugs, it must be employed only when actually needed, for not only are too frequent injections likely to create a condition which makes their continuance more and more necessary, but they sometimes do great and irreparable injury by causing permanent dilatation of the rectum and its sphincters.

HYPNOTICS.

Hypnotics are remedies that produce or tend to produce sleep. The leading hypnotics are chloral hydrate, sulphonal and trional.

Chloral Hydrate is a white crystalline substance, having a pungent odor and a burning, bitter taste. It is soluble in water, and is a useful remedy in tetanus and other nervous disturbances, delirium tremens, chorea, hysteria, strychnia poisoning, convulsions, etc. It does not cause headache or nausea, and does not constipate, as opium does. Combined with an equal part of bromide of potassium, it is excellent to quiet the nerves. The dose is from five to sixty grains. An overdose is dangerous.

Sulphonal and Trional are coal tar preparations and occur in white tasteless crystals, soluble in hot liquids. They are better than chloral to relieve sleeplessness, and are also safer. There is a difference of opinion as to which is the better remedy, but trional seems to have the preference. Both are safe and reliable, and do not leave the after effects of opiates. The dose is from ten to twenty grains. Ten grains may be taken on retiring and not repeated. If that amount is not effectual, a larger dose should be

tried the next evening. They are patented preparations and are sold at exorbitant prices.

ANTHELMINTICS.

Anthelmintics are drugs which cause the expulsion of worms.

Santonin is a colorless, crystalline substance having a bitter taste. It is very conveniently put up with calomel in a chocolate coated trochee. Of those containing one-half grain, from one to three are sufficient for a child. Santonin is especially effective against the round worm—*ascarides lumbricoides*.

Male Fern.—The oil of male fern is an almost certain agent, if properly taken, for the expulsion of the tape worm. The dose is from one-half to two drams. This should be given in divided doses, preceded by a fluid diet and followed by an active purge.

Pomegranate.—A decoction of the bark of the fresh root of the pomegranate is an effective tape worm remedy. A decoction prepared by boiling two ounces of the bark in a quart of water down to a pint is the average quantity required. This may be given in two ounce doses every hour until all is taken.

Pumpkin Seed is one of the best remedies for tape worm. Two ounces of the fresh seed are pounded in a mortar with a half pint of water until the husks are loosened, and an emulsion made. The husks are strained out and the emulsion taken in one dose. If one dose is not successful, try again the following morning. All tape worm remedies should be taken after a fast of twenty-four hours, and followed by an active cathartic.

Quassia.—The infusion of quassia is a safe and effective remedy for pin or seat worms—*ascarides vermiculares*. It is injected into the rectum and held there several minutes. The external parts must be washed with a very weak solution of carbolic acid at the same time (a half-teaspoonful of acid to the pint of water).

MISCELLANEOUS.

Arnica.—The tincture of arnica is prepared from the root of arnica montana, a mountain plant. It has obtained a wide reputation for the relief of external bruises, strains and inflammations—a reputation which it does not deserve. Its effects are largely due either to the rubbing which usually accompanies its application, or to the imagination, or to the alcohol of the tincture, which of itself is an excellent liniment.

Asafetida is an odorous gum which exudes from the root of an eastern tree. In Persia and other countries where it grows, the gum is used as a condiment with meats and other eatables. It is soluble in spirits, and may be given that way, or in pill form. The dose is from two to five grains. Taken in moderate doses it aids digestion, and gently stimulates all the bodily functions. It is one of the best known remedies for flatulence or colic of infants, and is useful in cases of flatulence in adults. It also gives good results in infantile convulsions, and in hysteria, and other nervous affections. The old idea that it would ward off contagious diseases has no foundation. The germs of disease do not seem to be affected in the least by its horrible odor.

Amyl Nitrite is an exceedingly volatile liquid, having in some degree the properties of nitro-glycerin. It is used by inhalation, and for this purpose is put up in fragile glass "pearls," which may be crushed in the handkerchief and the drug thus inhaled. It often affords speedy relief in spasmodic asthma and angina pectoris. If taken at the first premonitory symptom, an epileptic convulsion may be averted.

Alum is a crystalline substance with a bitter, astringent taste. In a dose of a teaspoonful, powdered, it is an emetic, safe and effective. It is useful as a gargle for sore mouth and throat, and, powdered, as an application to cuts and ulcers. Burned alum is a favorite home remedy for proud flesh in wounds and ulcers. A teaspoonful of the powdered alum in water will give relief in case of spasmodic croup, by exciting vomiting. Any other emetic will do the same thing, but alum is safe, and in most families is usually at hand.

Bromide of Potassium.—The bromide of potash occurs in colorless cubical crystals, soluble in water. The dose is from fifteen grains to two drams. The principal use of the bromide is as a nerve sedative. It greatly lessens reflex irritability, slightly reduces sensibility to pain, and, in large doses, produces a feeling of drowsiness. Bromides are used for the relief of convulsions of all kinds, but especially for those of epilepsy. Some cases of epilepsy are cured by them. The bromides are also useful in insomnia, delirium tremens, acute mania, congestive headache, tetanus, and strychnia poisoning. When their use is long continued, there may be produced a condition of bromine poisoning, called brominism. The bromides of soda, ammonium, calcium,

lithium and strontium are all used with or in place of potash. They have similar effects.

Belladonna. —The extract and tincture of belladonna and the sulphate of atropine are obtained from the plant commonly known as the deadly nightshade. Everyone knows its power of dilating the pupil of the eye. Belladonna is an active poison. The medicinal dose of the tincture is from five to twenty drops; of atropine from one-one hundred and twentieth to one-sixtieth of a grain. Belladonna lessens the secretions of the glands. This is seen in the dryness of the mouth and throat following a dose. It may be given in cases of salivation, acute nasal catarrh with copious watery secretions, incontinence of urine, and night sweats. There is a long list of diseases which it is said to benefit, but, in most of them, it is unreliable. Externally, it is used in liniments and plasters. *Stramonium* (jimson) and *hyoscyamus* (henbane) resemble belladonna in their actions and uses.

Cerium Oxalate is an insoluble white powder; a salt of the metal cerium. It may take the place of bismuth, and is principally used as a remedy for vomiting. It restrains vomiting from various causes, but especially the vomiting of pregnancy. The dose is from two to five grains, usually given in pill form.

Cocaine is an alkaloid derived from a South American plant—the erythroxylon coca. It is used almost entirely as a local anesthetic. On mucous membranes, as of the eye, mouth and nose, it readily produces anesthesia by simple contact, but not so on the skin. There it must be introduced beneath the skin by a hypodermic syringe. Different solutions are used, varying in strength from one to four per cent. It should be remembered in using it that there is danger of forming the “cocaine habit,” which is as serious as the morphine habit.

Camphor is the gum of an eastern tree. Spirits of camphor is camphor gum dissolved in alcohol. Externally, it is a counter irritant, producing redness and heat. The powdered gum is an ingredient of most tooth powders. It is a mild nerve sedative, useful in nervousness, hysteria, mania, etc. Inhaled, it is a heart stimulant, useful in syncope or fainting, palpitation and threatened heart failure.

Collodion is a syrupy liquid composed of ether, alcohol and gun cotton. When applied to the skin it produces a firm, protecting film. It is useful for covering abrasions, small cuts, wounds,

etc. When first applied to a raw surface it smarts severely. A clean wound may be sealed with collodion and kept clean.

Chloroform is a colorless liquid of a pleasant ethereal odor and a sweet, burning taste. It dissolves many other drugs, oils, resins and fats. Used externally it is a counter irritant. It may be mixed with turpentine and sweet oil, or with camphor. Its principal use is as an anesthetic. It is more powerful than ether, but not quite as safe. The principal danger from chloroform is to the heart; that from ether to the lungs.

Sulphuric Ether is a thin, colorless liquid with a characteristic odor and sweetish taste. The nitrous spirits of ether has already been mentioned as a diuretic. Ether is mainly used as an anesthetic. It is dangerous to handle at night, for the reason that its vapor takes fire and burns readily. Both these drugs should be used only when administered by a physician.

Dandelion.—The root of the dandelion has long had a popular reputation as an agent of great medicinal virtues. It has been used as a home remedy and in many patent nostrums. Beyond being a mild tonic, it is worthless.

Glycerin is a thick, syrupy liquid, having no odor and a sweetish taste. It is derived from animal fats by heat and pressure, and is soluble in water and alcohol. It is a weak antiseptic, and, as a rule, is not irritating to the skin, though it is with some persons. Applied to the tissues it abstracts water from them. Internally it has little effect, but is an excellent vehicle for a number of other remedies. It is useful as an application for chapped skin, inflamed membranes of the nose and throat, and as an injection in cases of constipation and dysentery.

Iodide of Potassium.—The iodide of potash occurs in white crystals, soluble in water, and having a salty taste. The iodide of sodium and the iodide of ammonium are very similar to it. The dose of either is from two to ten grains, but more of the iodide of potash may be given, up to a dram. The principal action of the iodides is to increase the elimination of the waste products of the body. They are given in cirrhosis of the liver, asthma, chronic bronchitis, chronic pneumonia and pleurisy, enlargement of the liver and spleen, scrofula, syphilis and chronic rheumatism.

Lithium is one of the rare metals. Its salts, but chiefly the carbonate and citrate, are used in medicine. The dose is from

two to ten grains. The carbonate is most used, is strongly alkaline, and renders the urine alkaline. It is beneficial in cases of rheumatism, especially in the chronic form, gout, the condition known as "the uric acid diathesis" and kidney stone. It may be advantageously combined with salicylate of sodium.

Lead.—Salts of the metal lead are used as medicines, mostly as external applications. The solution of the subacetate of lead is most useful. It may be applied in cases of burns, eczema, erysipelas, ivy poisoning, nettle rash, herpes, or as an injection for inflammation of the urethra. Combined with a small amount of tincture of opium it is generally useful for relieving pain in external parts.

Lobelia, or *Indian Tobacco*, is quite popular as a household remedy, and among certain herb doctors and quacks. Its principal action is as an emetic, for which purpose it is excelled by many other remedies. It is also a mild tonic, diuretic and cathartic. Its most important use is in the treatment of asthma. On the whole it is a drug which could easily be dispensed with.

Opium is the dried juice of the unripe poppy. Powdered opium is a brown powder, having a bitter, nauseous taste. It depends for its strength on the morphine it contains. The tincture of opium is often called laudanum, and a tincture containing camphor and other drugs is much used under the name paregoric. Morphine is prepared from opium, and is about twelve times as strong as the powder. Codeine is another preparation, about one-fourth as powerful as morphine. The dose of laudanum is from ten to thirty drops; of paregoric, from ten to sixty drops; of powdered opium, from one to four grains; of codeine, from one-fourth to one grain; and of morphine, from one-eighth to one-third of a grain. After taking opium for a length of time, a larger dose is required. Opium is a narcotic poison. The best antidotes are coffee, strychnia, atropine and physical exercise. The patient must be kept awake and in motion if possible.

In small doses, opium stimulates the imagination, but not the reason or judgment. Its continued use renders the moral sense less acute. It depresses the heart and muscular powers, and lessens the action of the glands and internal organs. Large doses produce a heavy sleep, followed by a stage of depression with headache, vertigo, nausea and mental confusion. The dreams of

opium narcosis are vivid and pleasing. Opium lessens sensibility to pain of all kinds, and is the greatest of all anodynes. It is more effective for the relief of pain when injected beneath the skin. It is given in inflammations, neuralgia, sciatica, rheumatism, headache, melancholia, diarrhea, and a long list of other diseases.

While opium is chiefly given to relieve pain, it is not true that it only blunts the perception of pain and is of no permanent aid. In many cases it is of real and lasting benefit. All opiates check the action of the bowels, codeine less than morphine. Opium is the best of all cough remedies, and codeine is, perhaps, the best of the opiates. In using opiates it is well to remember the danger of forming the habit.

Ox Bile, as its name implies, is the bile of the ox. It is purified and dried to about the consistency of tar. It may be given with benefit in cases of jaundice when the gall duct is obstructed. It is usually given in pill form, in doses of from two to three grains. It acts as an antiseptic and stimulates the action of the bowels.

Pepsin is a natural ferment found in the human stomach. That used in medicine is prepared from the stomach of the hog and given when, owing to disease, the natural pepsin is not produced in sufficient quantity. It is a yellowish gray powder, having a disagreeable odor and taste. The dose is from two to five grains. As to its efficiency there is some doubt. The dose of saccharated pepsin is from twenty grains to one dram. The liquid preparations are not as reliable.

Pancreatin is a powder similar to pepsin in preparation and theory of use. It is prepared from the pancreases (sweetbreads) of animals, and given to supply the want of the natural pancreatic juices, when, for any reason, they fail. It resembles pepsin in appearance, but is odorless and has rather a pleasant taste.

Silver Nitrate.—The nitrate of silver is used in medicine, both externally and internally. The dose is from one-eighth to one-half a grain. It is given for ulcer of the stomach, jaundice, cholera infantum, acute and chronic dysentery, ulcer of the rectum, and various diarrheas.

WEIGHTS AND MEASURES.

FLUID MEASURE.

60 minims, 1 fluid dram, written 1 fl̄ or ʒj.

8 drams, 1 fluid ounce, written 1 fl̄ or ʒj.

16 fluid ounces, 1 pint, written 1 O, or Oj.

8 pints, 1 gallon, written 1 C. or C-j.

One minim of thin liquids is about equal to one drop.

One dram equals an ordinary teaspoonful.

Two drams equal an ordinary dessertspoonful.

Four drams equal an ordinary tablespoonful.

One ounce equals two ordinary tablespoonfuls.

Two ounces equal an ordinary wineglassful.

Four ounces equal an ordinary teacupful.

Thick liquids cannot be measured by the drop or spoonful.

APOTHECARY'S WEIGHTS.

60 grains, 1 dram, written ʒ.

8 drams, 1 ounce, written 1 ʒ.

12 ounces, 1 pound, written 1 lb.

Grains, drams and ounces by weight cannot be measured by bulk. Most solid preparations are now put up in tablets, each containing an exact amount of a certain drug, thus affording an easy way to give preparations which cannot be measured without special instruments. Quinine may be measured by capsules; thus a No. 2 capsule will hold three grains; but as drugs vary greatly in weight, other powders cannot be measured with the quinine capsule. Although the No. 2 capsule holds three grains of quinine it will hold four of aloes, eight of bismuth, and still more of calomel.

When possible, liquids should be measured in a small glass graduate, which may be procured of any druggist; and solids should be given either in tablet form, or by weight. Otherwise there is no certainty as to the amount given.

THE ADMINISTRATION OF MEDICINES.

The dose of any medicine is the quantity of it which has been found through experience to be necessary to produce its curative effects. It varies greatly in different individuals, and in the same individual under different circumstances. The principal conditions which modify the action of medicines and affect their

dosage are the age, weight, sex, habits and health of the individual, and the intervals between the doses.

In general it may be stated that a smaller dose should be given

To a child than to an adult;

To an aged person than to an adult between twenty-one and sixty;

To a light person than to a heavy one;

To a weak person than to a strong one;

To a female than to a male;

To one living within doors than to one living in the open air.

Most medicines give better results in small doses frequently repeated, than in large doses at long intervals. If in doubt as to the quantity required, give the smaller dose. Most drugs when used unnecessarily are liable to be injurious.

Except in the department of "Diseases of Children," the doses indicated in this work, unless otherwise stated, are for adults. Perhaps the best way to arrive at the proper dose for a child is by a comparison of weights. Thus, if the child weigh one-third as much as the average adult, the average being about 150 pounds, he will require one-third as large a dose; if he be one-fifth as heavy he will require one-fifth the dose, and so on. A youth from 11 to 16 years of age usually requires from $\frac{1}{3}$ to $\frac{1}{2}$ the adult dose; and one from 17 to 20 years of age from $\frac{2}{3}$ to $\frac{4}{5}$ the adult dose.

Another way of determining the size of the dose for a child under thirteen years of age is found by the following rule: To the age of the child add 12, and by the sum thus obtained divide his age, the resulting fraction will show the part of the adult dose required. Thus, for a child six years old we have $\frac{6}{6+12} = \frac{6}{18} = \frac{1}{3}$, and the dose is one-third that for the adult. In this way the following table has been prepared:

To a child 1 year old give $\frac{1}{13}$ of the adult dose.			
"	2 years	"	$\frac{1}{7}$ " " "
"	3 "	"	$\frac{1}{5}$ " " "
"	4 "	"	$\frac{1}{4}$ " " "
"	6 "	"	$\frac{1}{3}$ " " "
"	8 "	"	$\frac{2}{5}$ " " "
"	9 "	"	$\frac{2}{4}$ " " "
"	10 "	"	$\frac{5}{11}$ " " "
"	12 "	"	$\frac{1}{2}$ " " "

A person from 60 to 70 years old should take $\frac{3}{4}$ the adult dose.

“ “ 70 “ 80 “ “ “ “ $\frac{2}{3}$ “ “
 “ “ 80 “ 90 “ “ “ “ $\frac{1}{2}$ “ “

In general, but little medicine should be given to children, and, when given, should be in small doses frequently repeated; never in large doses at long intervals. Don't be too free in the use of drugs. Both the patient and the physician are too prone to forget that the real cure must be wrought by the reparative energies of the system, and that medicines should be given only at such times and in such quantities as will best assist nature in its combats with disease.

MEDICINAL DOSE LIST.

PROPER NAME.	COMMON NAME.	PREPARATION.	DOSE.
Acetanilidum.....	Acetanilide.....	Crystals.....	2 to 15 grains.
Acetic Acid.....	Vinegar is impure ac. acid.	Liquid.....	1 to 2 drams.
Arsenicum.....	White Arsenic.....	Powder.....	$\frac{1}{60}$ to $\frac{1}{12}$ grain.
Arsenicum.....	Fowler's Solution.....	Liquid.....	1 to 10 drops.
Aconitia.....	Aconite, Monkshood.....	Tincture.....	2 to 10 drops.
Alcohol.....	Alcohol.....	Liquid.....	$\frac{1}{2}$ to 2 ounces.
Aloes.....	Aloes.....	Extract.....	$\frac{1}{4}$ to 6 grains.
Alum.....	Alum.....	Crystals.....	10 to 15 grains.
Ammonia Carbonate.....	Am. Carb. Smelling Salts.	Crystals.....	3 to 10 grains.
Ammonia Chloride.....	Sal Ammoniac.....	Crystals.....	5 to 20 grains.
Amyl Nitrite.....	Amyl Nitrite.....	Liquid.....	Inhalation.
Antimony.....	Antimony.....	Powder.....	2 to 6 grains.
Antimony Tartrate.....	Tartar Emetic.....	Crystals.....	$\frac{1}{8}$ to 2 grains.
Anise Oil.....	Anise Oil.....	Oil.....	1 to 4 drops.
Apomorphia.....	Apomorphine.....	Powder.....	$\frac{1}{20}$ to $\frac{1}{4}$ grain.
Aristol.....	Aristol.....	External Application.	
Arnica.....	Leopard's Bane.....	Tincture.....	1 to 2 drops.
Assafœtida.....	Assafœtida.....	Gum.....	5 to 20 grains.
Atropia Sulphate.....	Atropine.....	Crystals.....	$\frac{1}{120}$ to $\frac{1}{60}$ grain.
Antipyrin.....	Antipyrin.....	Powder.....	3 to 20 grains.
Balsam Peru.....	Balsam of Peru.....	Liquid.....	10 to 15 drops.
Belladonna.....	Deadly Nightshade.....	Tincture.....	10 to 20 drops.
Benzoic Acid.....	Benzoic Acid.....	Crystals.....	5 to 15 grains.
Bismuth Subnitrate.....	Bismuth.....	Powder.....	5 to 20 grains.
Bryonia.....	Byrony.....	Tincture.....	20 to 60 drops.
Buchu.....	Buchu.....	Tincture.....	1 to 2 drams.
Caffeina.....	Caffeine.....	Crystals.....	2 to 10 grains.
Calamus.....	Sweet Flag.....	Tincture.....	1 to 2 drams.
Calcium Chloride.....	Chloride of Lime.....	Crystals.....	3 to 10 grains.
Calomel.....	Calomel.....	Powder.....	$\frac{1}{10}$ to 10 grains.
Camboge.....	Gamboge.....	Powder.....	$\frac{1}{4}$ to 3 grains.
Camphor.....	Camphor.....	Spirits.....	10 to 30 drops.
Camphor Monobromate.....	Camphor.....	Crystals.....	2 to 10 grains.
Cannabis Indica.....	Indian Hemp, Hasheesh.	Tincture.....	5 to 20 drops.

Cantharis.....	Cantharides, Spanish Fly.	Tincture.....	5 to 20 drops.
Capsicum.....	Pepper.....	Tincture.....	5 to 20 drops.
Carboligni.....	Charcoal.....	Powder.....	10 to 60 grains.
Carbolic Acid.....	Carbolic Acid.....	Liquid.....	1 to 3 drops.
Cardamon.....	Cardamon.....	Tincture.....	$\frac{1}{2}$ to 2 drams.
Caryophyllum.....	Cloves.....	Tincture.....	$\frac{1}{2}$ to 1 dram.
Caulophyllum.....	Blue Cohosh.....	Tincture.....	30 to 60 drops.
Cascara Sagrada.....	Cascara.....	Fl. Extract.....	5 to 30 drops.
Cascarilla.....	Cascarilla.....	Tincture.....	$\frac{1}{2}$ to 2 drams.
Cerium Oxalate.....	Cerium Oxalate.....	Powder.....	1 to 10 grains.
Cetraria.....	Iceland Moss.....	Decoction.....	2 to 3 grains.
Chloranodyne.....	Chloranodyne.....	Liquid.....	5 to 15 drops.
Chenopodium.....	Worm Wood.....	Powder.....	20 to 40 grains.
Chionanthus.....	Fringe Tree.....	Fl. Extract.....	5 to 60 drops.
Chloral Hydrate.....	Chloral.....	Crystals.....	5 to 60 grains.
Chloroform.....	Chloroform.....	Liquid.....	3 to 10 drops.
Cimicifuga Racemosa.....	Black Cohosh.....	Tincture.....	15 to 60 drops.
Cinchona Bark.....	Cinchona Bark.....	Tincture.....	$\frac{1}{2}$ to 1 dram.
Cinnamomum.....	Cinnamon Bark.....	Powder.....	3 to 10 grains.
Cinnamomum.....	Cinnamon Bark.....	Tincture.....	1 to 2 drams.
Citric Acid.....	Citric Acid.....	Crystals.....	10 to 30 grains.
Coca Erythroxyton.....	Coca.....	Fl. Extract.....	1 to 2 drams.
Cocaine Hydrochlorate.....	Cocaine.....	Liquid.....	$\frac{1}{5}$ to 1 grain.
Codeina.....	Codeine.....	Fl. Extract.....	$\frac{1}{4}$ to 1 grain.
Colchicum.....	Meadow Saffron.....	Tincture.....	15 to 30 drops.
Cod Liver Oil.....	Cod Liver Oil.....	Oil.....	$\frac{1}{2}$ to 2 ounces.
Colocynth.....	Bitter Cucumber.....	Extract.....	1 to 2 grains.
Columba.....	Columbo.....	Tincture.....	$\frac{1}{2}$ to 2 drams.
Conium.....	Poison Hemlock.....	Extract.....	4 to 8 grains.
Convallaria.....	Lily of the Valley.....	Tincture.....	10 to 20 drops.
Copaiba.....	Copaiba.....	Balsam.....	20 to 30 drops.
Copper Sulphate.....	Blue Vitriol.....	Crystals.....	$\frac{1}{4}$ to 2 grains.
Corn Silk.....	Corn Silk.....	Fl. Extract.....	1 to 2 drams.
Cornus Florida.....	Dogwood.....	Fl. Extract.....	$\frac{1}{4}$ to 1 dram.
Creasote.....	Creasote.....	Solution.....	$\frac{1}{2}$ to 2 drops.
Creolin.....	Creolin.....	External Only.	
Creta Præparata.....	Prepared Chalk.....	Powder.....	20 to 60 grains.
Croton Oil.....	Croton Oil.....	Oil.....	1 to 3 drops.
Cubebs.....	Cubebs.....	Powder.....	1 to 2 drams.
Damiana.....	Damiana.....	Extract.....	1 to 5 grains.
Digitalis.....	Foxglove.....	Tincture.....	2 to 10 drops.
Disoscorea.....	Wild Yam.....	Fl. Extract.....	5 to 20 drops.
Dover's Powder.....	Dover's Powder.....	Powder.....	5 to 10 grains.
Dulcamara.....	Bittersweet.....	Extract.....	5 to 10 grains.
Elaterium.....	Elaterium.....	Powder.....	$\frac{1}{16}$ to $\frac{1}{2}$ grains.
Ergota.....	Ergot.....	Fl. Extract.....	5 to 30 drops.
Ergotinum.....	Extract of Ergot.....	Extract.....	2 to 5 grains.
Eucalyptol.....	Eucalyptus.....	Oil.....	1 to 5 drops.
Euonymus.....	Wahoo.....	Tincture.....	10 to 40 drops.
Fel Bovis.....	Ox Bile.....	Liquid.....	5 to 10 grains.
Ferri Chloridum.....	Chloride of Iron.....	Tincture.....	5 to 20 drops.

Ferri Phosphas.....	Phosphate of Iron.....	Crystals.....	5 to 10 grains.
Ferri Sulphas.....	Sulphate of Iron.....	Crystals.....	3 to 5 grains.
Galla.....	Nut Galls.....	Powder.....	8 to 20 grains.
Gaultheria.....	Wintergreen.....	Oil.....	1 to 2 drops.
Gelsemium.....	Yellow Jasmine.....	Tincture.....	5 to 20 drops.
Gentiana.....	Gentian.....	Comp. Tincture.....	$\frac{1}{2}$ to 2 drams.
Glycerinum.....	Glycerine.....	Liquid.....	$\frac{1}{2}$ to 1 dram.
Glycyrrhiza.....	Liquorice Root.....	Extract.....	$\frac{1}{2}$ to 1 dram.
Granati.....	Pomegranate Root Bark.....	Powder.....	20 to 30 grains.
Grindelia Robusta.....	Grindelia, Nuttal.....	Extract.....	2 to 4 grains.
Guaiaacol.....	Guaiaacol.....	Fluid.....	$\frac{1}{2}$ to 2 drops.
Guaiacum.....	Guaiac.....	Resin.....	10 to 30 grains.
Hæmatoxylon.....	Logwood.....	Decoction.....	1 to 2 ounces.
Hamamelis.....	Witch Hazel.....	Fl. Extract.....	2 to 5 drops.
Helleborus Niger.....	Black Hellebore.....	Powder.....	5 to 10 grains.
Helonias.....	Helonias Compound.....	Fl. Extract.....	$\frac{1}{2}$ to 1 dram.
Hydrastis.....	Golden Seal.....	Tincture.....	20 to 60 drops.
Hydrocyanic Acid.....	Hydrocyanic Acid.....	Dilute.....	2 to 8 drops.
Hydrochloric Acid.....	Muriatic Acid.....	Dilute.....	10 to 30 drops.
Hydriodic Acid.....	Hydriodic Acid.....	Syrup.....	1 to 2 drams.
Hydrangea.....	Hydrangea.....	Fl. Extract.....	10 to 30 drops.
Hydrogen Peroxide.....	Hydrogen Peroxide.....	Liquid for external use.	
Hyoscyamus.....	Henbane.....	Tincture.....	10 to 30 drops.
Ichthyol.....	Ichthyol.....	Semifluid.....	10 to 30 grains.
Ignatia.....	St. Ignatius' Bean.....	Extract.....	$\frac{1}{8}$ to 1 grain.
Iodoform.....	Iodoform.....	Powder for external use.	
Iodum.....	Iodine.....	Tincture.....	5 to 20 drops.
Ipecacuanha.....	Ipecac.....	Syrup.....	1 to 2 drams.
Ipecacuanha.....	Ipecac.....	Powder.....	1 to 30 grains.
Jaborandi.....	Pilocarpine or Jaborandi.....	Tincture.....	30 to 60 drops.
Jalap.....	Jalap.....	Powder.....	2 to 30 grains.
Juglans.....	Walnut Leaves.....	Decoction.....	1 to 2 ounces.
Juniperus.....	Juniper.....	Oil.....	1 to 3 drops.
Kola.....	Kola.....	Fluid Extract.....	10 to 30 drops.
Leptandrin.....	Leptandrin.....	Resin.....	1 to 2 grains.
Lithium Carbonate.....	Carbonate of Lithium.....	Powder.....	3 to 10 grains.
Lobelia.....	Indian Tobacco.....	Tincture.....	10 to 30 drops.
Magnesium.....	Light Magnesia.....	Powder.....	10 to 20 grains.
Magnesium Sulphate.....	Epsom Salts.....	Crystals.....	1 to 4 drams.
Male Fern.....	Male Fern.....	Oleo-Resin.....	10 to 20 drops.
Marubium.....	Horehound.....	Infusion.....	1 to 2 ounces.
Mentha Piperita.....	Peppermint.....	Oil.....	1 to 4 drops.
" ".....	".....	Water.....	1 to 2 ounces.
Menthol.....	Menthol.....	Crystals.....	External use.
Morphia Sulphate.....	Morphine.....	Powder.....	$\frac{1}{8}$ to $\frac{1}{4}$ grain.
Morrhue Oleum.....	Cod Liver Oil.....	Oil.....	1 to 8 drams.
Myrrha.....	Myrrh.....	Tincture.....	30 to 60 drops.
Mass of Mercury.....	Blue Mass.....	Mass.....	1 to 5 grains.
Naphthol.....	Beta Naphthol.....	Powder.....	2 to 15 grains.
Nitro Glycerine.....	Nitro Glycerine.....	Oil.....	$\frac{1}{100}$ to $\frac{1}{10}$ grain.
Nitrate of Silver.....	Nitrate of Silver.....	Crystals.....	$\frac{1}{10}$ to $\frac{1}{4}$ grains.

Nux Vomica.....	Nux Vomica.....	Tincture.....	10 to 20 drops.
Opium, Camphorated....	Tincture Paregoric.....	Tincture.....	15 to 60 drops.
Opium, tincture.....	Laudanum.....	Tincture.....	5 to 30 drops.
Opium, Powdered.....	Opium.....	Powder.....	$\frac{1}{4}$ to 1 grain.
Pancreatin.....	Pancreatin.....	Powder.....	2 to 5 grains.
Panax.....	Ginseng.....	Liquid.....	$\frac{1}{8}$ to 1 dram.
Pepsin.....	Pepsin.....	Powder.....	2 to 5 grains.
Pennyroyal.....	Pennyroyal.....	Fluid Extract..	$\frac{1}{2}$ to 2 drams.
Petroleum.....	Coal Oil.....	Oil.....	$\frac{1}{2}$ to 1 dram.
Phenacetine.....	Phanacetine.....	Powder.....	5 to 10 grains.
Phosphorus.....	Phosphorus.....	Solid.....	$\frac{1}{150}$ to $\frac{1}{12}$ grain.
Phostigma.....	Calabar Bean.....	Powder.....	1 to 4 grains.
Plumbum Subacetate....	Subacetate of Lead...	Solution.....	External.
Pine Compound.....	Pine Compound.....	Syrup.....	15 to 60 grains.
Phytolacca.....	Poke Root.....	Powder.....	1 to 5 grains.
Podophyllum.....	May Apple, Mandrake...	Powder.....	10 to 20 grains.
Potassium Acetate.....	Acetate of Potash.....	Crystals.....	10 to 20 grains.
Potassium Bicarbonate..	Saleratus.....	Powder.....	10 to 40 grains.
Potassium Bromide.....	Bromide of Potash.....	Crystals.....	5 to 60 grains.
Potassium Chlorate.....	Chlorate of Potash.....	Crystals.....	5 to 20 grains.
Potassium Citrate.....	Citrate of Potash.....	Powder.....	10 to 60 grains.
Potassium Iodide.....	Iodide of Potash.....	Crystals.....	5 to 60 grains.
Potassium Nitrate.....	Saltpetre.....	Crystals.....	5 to 30 grains.
Potassium Permanganate.	Permanganate of Potash..	Crystals.....	1 to 2 grains.
Potassium Tartrate, Acid.	Cream of Tartar.....	Powder.....	$\frac{1}{2}$ to 2 drams.
Prunus Virginia, Cortex..	Wild Cherry Bark.....	Syrup.....	$\frac{1}{2}$ to 2 drams.
Quinine Bisulphate.....	Quinine Bisulphate.....	Powder.....	5 to 40 grains.
Quinine Sulphate.....	Quinine.....	Powder.....	2 to 30 grains.
Resorcin.....	Resorcin.....	Crystals.....	5 to 10 grains.
Rhei Radix.....	Rheubarb.....	Powder.....	2 to 20 grains.
Ricini Oleum.....	Castor Oil.....	Oil.....	$\frac{1}{2}$ to 2 ounces.
Rutæ Oleum.....	Oil of Rue.....	Oil.....	1 to 4 drops.
Sabinæ.....	Sabine.....	Oil.....	1 to 4 drops.
Sabal.....	Saw-Palmetto.....	Fluid Extract..	10 to 20 drops.
Saccharum Lactis.....	Sugar of Milk.....	Powder.....	1 to 2 drams
Salacinum.....	Salacin.....	Crystals.....	5 to 20 grains.
Salicylic Acid.....	Salicylic Acid.....	Crystals.....	5 to 30 grains.
Scammonium.....	Scammony.....	Resin.....	2 to 10 grains.
Scilla.....	Squills.....	Syrup.....	30 to 60 drops.
Scutellaria.....	Scull Cap.....	Fluid Extract..	5 to 20 drops.
Salol.....	Salol.....	Crystals.....	5 to 20 grains.
Sanguinaria.....	Bloodroot.....	Powder.....	1 to 20 grains.
Santoninum.....	Santonin.....	Crystalline.....	2 to 5 grains.
Senega.....	Snakeroot.....	Powder.....	1 to 20 grains.
Senna.....	Senna.....	Infusion.....	1 to 2 ounces.
Serpentaria.....	Snakeweed.....	Fluid Extract..	10 to 20 drops.
Soda Tartarata.....	Rochelle Salts.....	Powder.....	$\frac{1}{2}$ to 4 drams.
Sodium Benzoate.....	Benzoate of Sodium.....	Powder.....	10 to 30 grains.
Sodium Bicarbonate.....	Baking Soda.....	Powder.....	5 to 20 grains.
Sodium Bromide.....	Bromide of Soda.....	Powder.....	10 to 30 grains.
Sodium Hypophosphite...	Hypophosphite of Soda...	Powder.....	5 to 10 grains.

Sodium Salicylate.....	Salicylate of Soda.....	Crystals	10 to 30 grains.
Sodium Sulphate	Glauber's Salts.....	Powder.....	$\frac{1}{2}$ to 1 ounce.
Spiritus Aetheris Nitrosus.....	Sweet Spirits of Nitre....	Solution	$\frac{1}{2}$ to 2 drams.
Staphisagriæ.....	Stavesacre Seeds.....	Oil	$\frac{1}{4}$ to 2 drops.
Stramonium.....	Thornapple, Jimson Weed.	Tincture.....	10 to 30 drops.
Stropanthus.....	Stropanthus.....	Tincture.....	2 to 10 drops.
Strychnia	Strychnine	Powder.....	$\frac{1}{60}$ to $\frac{1}{40}$ grain.
Sulphonah.....	Sulphonah.....	Crystals	10 to 30 grains.
Sulphur	Sulphur	Powder.....	20 to 60 grains.
Stillingia	Queen's Root	Fluid Extract ..	$\frac{1}{2}$ to 1 dram.
Santali Oleum.....	Oil of Sandalwood	Oil	10 to 20 drops.
Sarsaparilla.....	Sarsaparilla.....	Liquid Extract ..	2 to 4 drams.
Tanacetum.....	Tansy	Oil	1 to 5 drops.
Tanic Acid.....	Tannin	Powder.....	5 to 15 grains.
Taraxicum Radix.....	Dandelion Root.....	Extract.....	5 to 15 grains.
Turpentine	Turpentine.....	Oil or Spirits...	5 to 30 drops.
Thymol.....	Thymol.....	Crystals	External use.
Toxicodendron	Poison Oak	Powder.....	1 to 3 grains.
Trifolium	Clover.....	Syrup	1 to 2 drams.
Triticum Repens	Tritica, Couchgrass.....	Liquid Extract ..	1 to 2 drams.
Tolu, Syrup.....	Syrup of Tolu.....	Syrup	$\frac{1}{2}$ to 2 drams.
Thyroid Extract.....	Thyroid Extract.....	Powder.....	2 to 5 grains.
Uva Ursi.....	Bear Berry Leaves	Infusion	1 to 2 ounces.
Yerba Santa	Syrup of Yerba Santa....	Syrup	1 to 2 drams.
Valerian	Valerian	Tincture.....	$\frac{1}{2}$ to 1 dram.
Veratrum Veride.....	Green Hellebore.....	Tincture.....	5 to 20 drops.
Virburnum Opulum.....	Cramp Bark.....	Fluid Extract ..	10 to 30 drops.
Viburnum Prunifolium.....	Black Haw.....	Liquid Extract ..	10 to 30 drops.
Vinum.....	Wine.....	Liquid.....	$\frac{1}{2}$ to 2 ounces
Warburg's Tincture.....	Warburg's Tincture.....	Tincture.....	$\frac{1}{4}$ to 1 dram.
Xanthoxylum.....	Prickly Ash Berries.....	Fluid Extract ..	5 to 10 drops.
Zincum Oxidum.....	Oxide of Zinc	Powder.....	$\frac{1}{4}$ to 5 grains.

NURSING.

By ROBERT S. MAGEE, M.D.

As recovery of the patient often depends more upon the care he receives than upon the medicine he takes, the importance of good nursing can hardly be overestimated. Everyone should know of what it consists, for, although the care of the sick is a higher duty, a more responsible work, than can best be performed without special knowledge and experience, in the large majority of all cases the members of the family care for each other, so that to almost everyone, sooner or later, the call comes to act as nurse, and to women it is likely to come as an imperative demand.



The Costume.

The Nurse.—Before mentioning her duties, a few words, applicable to all women while acting in this capacity, should be said of the nurse herself. The trained nurse of the hospitals wears a uniform consisting of a blue gingham dress, a large white apron, white linen collar and cuffs, or detachable white linen half-sleeves instead of cuffs, soft, heelless slippers, and a white India linen cap, which is the badge of her profession. At some hospitals pink gingham is worn, and at others white gingham, instead of the blue.

While it is not expected that others will don this costume, it is very desirable that every woman who performs the duties of nurse should so

far imitate it as to wear aprons and dresses of soft, easily washed cotton or linen, and easy, quiet shoes. Rubber soled slippers are best for the sick-room, but if these cannot be obtained, the shoemaker will attach rubber heels to your every-day shoes, or you can yourself nail on small pieces of the sole of an old overshoe, thus making them almost noiseless. The nurse should also pay such attention to her toilet as to be cleanly in person and dress, to have well brushed teeth and a sweet breath, and to be neat and tidy in her general appearance. Her nails should always be closely cut and well brushed, and her hands be kept warm, soft and smooth. Cold cream, or glycerin, or a mixture of one part of glycerin and two of bay rum, well rubbed into the hands at night, will greatly aid in softening and keeping them in good order.

A good nurse will have self-control, be calm in all emergencies, quiet and discreet, and maintain a cheerful, hopeful bearing. A peaceful but cheery atmosphere will prevail wherever she goes. She will engage in no discussions with the patient, or in his presence, and will allow no whispering in his room, or any thing else likely to excite or agitate him, but will try to secure to him repose of mind, as well as of body. As prolonged usefulness without health is impossible, she will care for herself as well as for her patient, and to this end will have a regular and proper diet, take an outing in the open air for an hour or two each day, and as far as possible have her regular hours of sleep.

Good nursing includes the faithful execution of the physician's orders, the personal care of the patient, attention to the cleanliness, temperature and ventilation of the sick-room, the control as far as may be of contagion and infection, an accurate reporting of the symptoms as they develop from day to day, and the proper preparation and administration of food.

The Physician's Orders.—The nurse should make a timetable showing the hours for giving the medicines prescribed, also those for giving food, then as each is given check the hour with a small mark, drawing a line through those hours at which, for any reason, food or medicine was omitted, thus forming an accurate and useful record for the inspection of the physician. It is a singular weakness of human nature that leads very many ignorant people to feel called upon to give advice to the afflicted, no matter how serious the case, or how competent and skillful

the physician in charge. Many a patient has lost his life because of well-meant interference of friends. It is as clearly the duty of the nurse to guard the patient against all such dangers as to administer medicines and food, and it often requires much tact and gentle firmness to ward them off.

Faithfully follow the directions of the physician, and, until his sanction has been obtained, permit the use of no additional remedies or foods, and substitute none, no matter by whom proposed. In many cases short calls may do the patient good; in others even personal friends may have to be excluded. The nurse must see at all times that visiting is not carried to the point of fatigue, and never permit the rehearsal of harrowing or exciting tales or the announcement of deaths, or any other startling news in the sick-room.

Personal Care.—Except in a few diseases, as spinal meningitis, in which the extreme nervousness of the patient requires the utmost quiet, it is of the first importance that the patient be kept clean. He must have "a clean skin, clean clothes, clean air and clean surroundings." Whether he wishes it or not, he should, as a rule, be thoroughly washed or sponged every morning with soap and water of the temperature most agreeable to him, and in the following order: - Face, ears, neck, hands, arms, chest, limbs, feet, back and abdomen. Take good care as soon as a part is washed to immediately and thoroughly dry it with a soft towel. Expose only the part that is being washed, or, if the air is chilly to the patient, do the sponging under cover of the blankets. The face and hands should also be washed every evening, and there should be such washing done at other times as occasion shall require. The teeth should be cleaned each day with a brush or lint, and the hair should be carefully combed and brushed. No iron-clad rule can be given as to the frequency of changing the body and bed linen, but be generous in this regard. Nothing adds more to the comfort of the bed-ridden than fresh night-shirts, sheets and pillows, but always air and warm the clean changes, in another room, before placing them upon the patient or his bed.

To change the under sheet, remove all covers, except one blanket and the upper sheet, then draw out this sheet, leaving the blanket next the patient. Remove the pillow, turn the patient on his side near the middle of the bed, and fold the soiled sheet close

to his back; against this soiled sheet place a clean one half rolled, spread the unrolled part of it smoothly over the exposed part of the mattress, and firmly tuck it in; then having turned the patient over on the clean sheet and removed the soiled one, unroll the clean sheet over the rest of the bed, draw it smoothly and tuck it firmly under the mattress. If the patient cannot be turned on his side, the sheet can be changed in a somewhat similar manner by working from the head to the foot of the bed.

To change the upper sheet, spread the clean sheet over the covering blanket, then, while holding the sheet with one hand, draw out the blanket, after which spread on the remaining bed clothes.

The Draw-sheet.—A draw-sheet is formed by folding an ordinary sheet crosswise into three or four thicknesses, placing it smoothly across the bed over the lower sheet so that it shall reach from the middle of the patient's back to his knees, and firmly tucking its ends under the mattress at both sides of the bed. When soiled it can easily be withdrawn and a new one substituted, an assistant lifting the patient a little if he is unable to raise himself.

Bed Sores.—Failure to keep the patient perfectly clean and dry, and to keep his bed dry and fresh, is the chief cause of bed sores. Besides taking great care to guard against these errors, the nates, back and hips should be examined daily in all cases of prolonged illness, and if any red spots are found, or there is complaint of any tenderness, after carefully washing and drying these parts, apply water and alcohol, water and vinegar, brandy, spirits of wine, or strong alum water, and, when the parts have dried, anoint them with olive oil, or vaseline, and having thoroughly rubbed it in, dust the parts with powdered boric acid, powdered oxide of zinc, or subnitrate of bismuth, or with powdered starch if none of the others be at hand, and repeat this treatment every three hours until all signs of sores disappear. These serious afflictions can nearly always be avoided by this treatment if begun early and properly continued. In all cases of paralysis it should be begun very early, and before the appearance of any redness. Care must always be taken to keep the bed free from crumbs and everything that would irritate the skin. Let there be no wrinkles. Smoothness of the bed is more desirable than softness. Keep the sheet drawn snugly and its edges well tucked under the mattress.

The nurse will sometimes find a bed sore when she first takes charge of a patient, in which case it is very important to heal it immediately. The following treatment, faithfully administered, will almost always cure: Wash the part with ether, apply to the sore a pad, about its size, of absorbent cotton saturated in glycerin, lay over it oil silk, and fasten it securely and smoothly with strips of adhesive plaster. Repeat this washing and dressing, at least twice daily.

The Sick-room.—In every well arranged home there should be a room specially designed for the use of the sick. It should have a southern aspect, several windows arranged to open at both top and bottom, abundant sunlight, and an open grate, and be so arranged that it can easily be isolated from the rest of the house during a case of infectious disease. It will be a great advantage to have another well ventilated room opening into it, and near at hand on the same floor a lavatory and water closet with an outside window. A water closet must never open directly into a sick-room, nor should such a room ever contain a stationary wash basin, sink or other sewer connection. The larger and more airy the room the better. It should be as far removed from the kitchen and living rooms as possible without fronting on a noisy street, and, for greater safety in cases of infection or contagion, should be in the highest story of the house. Its floor should be one for use without carpets, its walls should be painted, or of a finish which can be washed; its woodwork plain and smooth, and without heavy moldings or cornices that would afford lodging places for dust.

Ventilation.—To no other class is ventilation so important as to the sick, for, although weak and less able to overcome toxic influences, they must for days, weeks, or even for months, breathe only such air as they can get in their apartments, yet, how often we find the atmosphere of the sick-room extremely foul and every crevice tightly closed. Instead of such an atmosphere, reeking with poisons from his exhalations, excretions and bodily discharges, the patient should have air as pure as it is possible for painstaking intelligence to furnish.

Pure air and cold air must not be confounded. Cold air from a hall or adjoining room is not what is needed, for such air may be very impure; but air from outdoors, as fresh and pure as can be obtained, and a gentle current of it should be kept

constantly flowing through the room. To this end, an outlet as well as inlet must be provided, for it is as important that impure air be carried out as that pure air be brought in. If care be taken to keep the patient from cold draughts, resort being made to screens or other devices, if necessary, to deflect the currents, there will be very little danger of his taking cold from the admission of outdoor air, even in midwinter. In connection with a window lowered a little from the top, a fire in an open grate makes a most excellent ventilator, and at the same time affords a safe means for the ready disposal of soiled dressings, cloths and other waste. When no fire is needed, a lighted lamp in the fireplace will heat the air sufficiently to create an upward current and serve a useful purpose.

With all the advantages just outlined the nurse should have little difficulty in keeping the sick-room cheerful and healthy. In small, inconvenient houses, with close dark rooms, her skill and inventive ability will often be taxed to the utmost, but a clear and positive knowledge as to the importance of pure air and cleanliness will prove a large part of the battle. In most cases where there is a will there will be a way.

Temperature.—It is not desirable that a patient who is covered in bed should be kept in as warm an atmosphere as is often found in an ordinary sitting room, and many recommend 60 degrees Fahrenheit as ideal for the sick-room, but as few nurses will feel safe in constantly remaining where it is so cold, we advise warmer air and lighter coverings for the patient. A thermometer should hang near the bed, and the temperature be kept as uniform as possible, care being taken that it shall not rise above 70 degrees. It should be remembered, too, that infants and old people require warmer air than others, that the room should be made warmer for bathing, and at the times when the patient leaves his bed, also that the temperature of the body is always lowest about three o'clock in the morning, and that there should be an extra blanket ready for use at that time.

The careful nurse will always have hot water within easy reach for use in case of an emergency. It is best applied to cold feet, or other parts, when carefully sealed in fruit jars and wrapped sufficiently to guard against burning the patient, for, in many cases of paralysis or numbness, a patient may be seriously blistered without his knowing it. Jugs and well stoppered bottles are also used for this purpose.

Furniture.—Iron bedsteads, good coil springs, and smooth, firm mattresses of excelsior or cotton are the best for the sick, and probably no bed is worse for them than a feather bed. When practicable, it is best to have two beds, one for use through the day, the other for the night, thus admitting of thorough airing, but, in cold weather, care must be taken to warm the fresh bed each time before putting the patient into it. There should be a lounge and table, an easy chair and one or two cane bottom chairs, but no upholstery and no portieres, woolen hangings, or curtains except plain roller shades, of a green tint, and no carpets, unless a single strip or rug that can often be taken outdoors and well shaken and aired, be spread in front of the bed for the comfort of the nurse and to aid in securing perfect quiet. All woolens and upholstery retain dust and infections, thus becoming sources of danger. A portable screen is often useful, and may be improvised by spreading a sheet over a clothes-horse, or an easily made frame.

The room should be made as cheerful as possible, and, except in cases of infectious diseases, pictures, with smooth frames that can be cleaned with a damp cloth, are almost a necessity; the same is true of potted plants, and cut flowers if kept in fresh water and removed as soon as they begin to dry and fade. Let everything be neat and tidy. No food, dishes, medicines, or medical appurtenances, bed-pans, or similar vessels, should be left in sight of the patient. In cases of infectious diseases they can be placed behind a screen. In all other cases they should be brought into the sick-room only when wanted for immediate use, and be removed as soon as they have been used. The room can be well swept only when the patient has been removed from it, but with a damp cloth wrapped on a broom most of the dust can be wiped from the floor, and twice a week all the window sills, sashes and other projections should be wiped with damp cloths.

Infectious Diseases are those caused by bacteria, or microscopic germs, disseminated without personal contact, direct or indirect. For the public safety, as well as for the protection of herself and the friends of the patient, it is very important that the nurse be so fully informed as to the nature of the disease in hand as to enable her the most effectually to checkmate its methods of spreading to others.

As shown in the Department of Sanitation, the infectious diseases are of two great classes, the air-borne and the water-borne.

The former class consists of those caused by germs which are carried in the air and, usually, first enter the system by being inhaled with the breath. Consumption, pneumonia, diphtheria, scarlet fever, yellow fever, small-pox, whooping cough, mumps, measles and influenza are of this class, and, although their germs differ widely as to virulence, and in their effects upon the body when they have found access to its tissues, we would in nearly all cases be safe from their ravages could the air we breathe be kept entirely free from them.

To this end, a patient with any of these diseases should be promptly isolated and, to reduce to a minimum the danger from infection after his recovery, the sick-room before the patient enters it should be cleared of all unnecessary furnishings, especially of all upholstery and woollens, since they afford good refuges for bacteria, some of which are so tenacious of life as to be a menace for years, lying dormant until they chance to find their way into a human being, then multiplying with as great rapidity and virulence as had the opportunity occurred when they first left the patient in which they were formed.

Ventilation must now be as perfect as possible, for the greater the dilution of the poison thrown off by the patient the better for him, and the less the danger to the nurse and to others, but special care must be taken that air from the sick-room shall not be blown into other parts of the house. As children have less power than adults to resist disease, they should be sent away. If the malady be one of the most serious, as scarlet fever or small-pox, there should be two nurses that, by relieving each other, each may have a few hours daily in the open air, and neither be obliged to sleep in the same room as the patient. Only the physician and nurses should have access to the room, and, as far as possible, all communication between it and the rest of the house should be cut off.

The nurse should wear only such clothing as can be boiled and washed, unless it is to be burned as soon as she is through with the case, for the danger from carrying such diseases in clothing is very great. As the hair of the nurse is also a source of much peril, she should wear over it a closely fitting cap, and wash the hair thoroughly in a strong disinfectant, such as one part of formalin in twenty parts of water, each time before mingling with other people. After carefully washing, and changing to

clean clothing kept in another room, she should take a brisk walk in the open air each day, nor should fatigue, or the dread of making the preparations, deter her from a faithful observance of these precautions for preserving her own health and efficiency.

The broom, brushes, cloths, etc., used, must not be taken from the room until the quarantine is over, and must then be burned. The dishes used should be kept in the room; in fact, nothing should be removed after the patient enters, unless it be immediately disinfected. The soiled clothing of the patient and nurse, and all bedding that requires washing, should be carried from the room in a tight bag and thrown, bag and all, into boiling water and boiled half an hour before it is sent to the wash. For the management of the sputa and nasal discharges of such patients, see Department of Disinfection and Disinfectants.

The bedsteads and all other furniture, floor, walls and wood-work should be wiped carefully twice a week with cloths wet in some disinfectant. A 1:1,000 bichloride of mercury solution (fifteen grains of the bichloride to a quart of water) is probably the best for this purpose; but a 1:20 solution of carbolic acid, or a two per cent solution of formaldehyde, will do. It must not be forgotten that these substances are poisonous and require careful handling, and that if bichloride or carbolic acid solutions are used upon the skin they must be applied only to small surfaces at one time, because of the danger from absorption. Sheets, or other large cloths, should be hung in various parts of the room, especially over the door, and be kept wet in the disinfecting solution. This precaution is important, partly because of the real good that it does, and partly because of its influence in reassuring the family and neighbors that the disease will thus be prevented from spreading.

The wonderful power of the mind over the body is often very clearly seen during epidemics, and no one can overestimate the services of the calm, cheerful nurse who, discerning between real and imaginary dangers, dispels false alarms and encourages hope. An intelligent comprehension of the situation is now valuable beyond measure. Depression, anxiety and fright invite disease by deranging the system and rendering it less able to resist, and many have died at such times simply from the stress of ignorant fear. Having taken every proper precaution, an individual is safer for keeping the mind occupied with healthful

themes and, as far as may be, pursuing his ordinary business routine.

Water-borne diseases are those caused by bacteria which are usually carried into the stomach of the patient in his drink, but sometimes are introduced with the food and, rarely, in other ways. Typhoid fever, malarial fever, cholera, and some of the diarrheas, are the principal examples of this class. In these diseases isolation of the patient is not necessary, for instead of being thrown off in the breath, or in eruptions or excretions of the skin, their bacteria are carried out in the excreta. The dissemination of these diseases is, therefore, prevented by thoroughly disinfecting all the discharges from the bowels, also all cloths and clothing used about the patient, and by keeping him clean.

A pint of strong disinfecting fluid, such as the bichloride or carbolic solution, should be kept standing in the vessel which receives the stools of the patient.

Never throw such stools into the common water closet, lest their disinfection may have been imperfect. A safe and convenient disposition of them is afforded by a trench or pit three or four feet deep, if each time dejections are thrown in they are immediately and thoroughly covered with fine dirt, and, when the pit is thus filled to within eighteen inches of the top, it is shoveled full of fresh earth, a new one being dug for further use; but let it be remembered that such an arrangement must never be less than 100 feet from any well or cistern, or other source of water supply, or where the drainage is toward such supply, and in case the soil or underlying stratum is of sandy formation, the pit must be much more than 100 feet away.

As flies often contaminate food with disease germs brought on their feet from excreta over which they have walked, it is very important that they never be allowed access to such sources of danger. For the disinfection of clothing nothing is better than steady boiling for thirty minutes. All soiled cloths and dressings should be burned. For the treatment of nasal discharges, sputa, and excreta, see the Department of Disinfection and Disinfectants.

Contagious Diseases.—Like the air and water-borne diseases, contagious diseases are due to germs, but to germs which are communicated from one person to another only through contact,

either direct or indirect. Itch, syphilis and gonorrhea are diseases of this class. Safety lies in destroying their germs as far as possible by such agents as the bichloride of mercury, and in touching the affected parts of the patient, or anything with which they have been in contact, only when absolutely necessary, and then immediately washing the hands in strong disinfectants to destroy or get rid of the bacteria that may have adhered to them. If soap is used for this purpose, the variety known as green soap, *saponis viridis*, specially prepared by druggists, is best, and the next best is the old-fashioned soft soap, made from grease and the lye of wood ashes, either being safer, because far more efficient as a cleanser and germicide, than any toilet or laundry soap. The same precautions as required in infectious diseases should be taken with the soiled bedding, cloths and clothing. The danger from handling gonorrheal clothing, then rubbing the eyes with the hands, is very great. Innocent laundresses have thus been made incurably blind in one week. Proper disinfection of the clothing before sending it to the wash would have prevented this possibility.

As to the management of the room and its contents at the conclusion of an infectious or contagious case, see Department of Disinfection and Disinfectants.

Corpses.—In case of death in the city, the undertaker will take immediate charge of the body, the sooner the better, but in remote country districts, it is necessary to prepare the body for burial before such aid can arrive, and in infectious cases this duty will devolve upon the nurse. In all cases the body should be washed in one of the disinfecting solutions and immediately placed upon its back on a wide board seven or eight feet long, the head end being raised about two feet higher than the feet, as by placing the one end in a chair and the other on the floor, that the blood, before coagulating, shall settle into the lower parts, thus preserving the natural color of the face, ears and neck (instead of permitting the purple or almost black discoloration often mistaken for immediate putrefaction), and adding from six to twelve hours to the time the body can be kept in good condition. Wet in the disinfectant a handful of cotton and place it under the buttocks, straighten the limbs, bind the feet together, fold the hands across the breast, hold the lower jaw in place by a snug bandage about the chin and head (the

jaws are likely to become fixed within forty-five minutes after death), and close the lips and eyes, gently placing small pieces of cotton, wet in the solution, over the eyelids with very little pressure. The quite common practice of using coins for this purpose should never be permitted, for they almost always distort the features by flattening the eyeballs. Cover the face with several thicknesses of cloth wet in the solution, spread a sheet, wet in the same, over the body and secure thorough ventilation, then thoroughly cleanse your own person and don a clean change of clothes.

Although it is the duty of the physician, when a patient has died of an infectious disease, to prohibit a public funeral, the nurse should also understand the great importance of this precaution, and never hesitate to use her influence on the side of safety.

The Observation of Symptoms.—The temperature of a healthy body changes very little, remaining at about 98.4 Fahrenheit whether in summer or winter, but in disease it may vary quite a number of degrees, and as these variations form important diagnostic symptoms they should be carefully reported by the nurse. A clinical thermometer, designed for this purpose, can be purchased at the drug store, and is a necessary part of the nurse's equipment. To ascertain the temperature, this instrument should be placed under the tongue of the patient and held there, the lips being kept closed, for three to five minutes, the nurse then carefully noting the point registered, after which the thermometer should be thoroughly cleansed. If the patient is unable to take the instrument in his mouth, it may be placed in his armpit, and the arm drawn down snugly by his side, or it may be anointed with vaseline or oil and inserted about an inch and a half into the rectum, and left there the required time. The rectal temperature is usually a little higher than that of the mouth and is more reliable.

The Pulse is ascertained by counting the beats of the radial artery, in the wrist just above the thumb, for one minute by the watch. The nurse should cultivate the ability to correctly observe all the symptoms of the patient, for if this be done fully and accurately from day to day, it will greatly aid the physician in prescribing the proper treatment. It is better to make this report in writing, and it should cover the following points:

Temperature and state of pulse at certain hours.

Bowels, number of movements, at what time and of what character.

Sleep, number of hours and of what quality.

Special symptoms, as vomiting, nausea, headache, etc., and the time of the occurrence of each.

The Preparation of Foods.—Cooking, in the broadest sense, is the palatable preparation of all articles of diet; but in its usual sense means the subjection of food to the action of heat; as by steaming, boiling, baking, roasting, broiling, either to render it palatable or digestible, or both. Cooking also destroys or renders harmless many of the poisons with which foods are sometimes contaminated.

Very different temperatures are required for the proper preparation of different kinds of food. The greatest heat to which eggs should ever be subjected is 160 degrees F., since at that point their albumen coagulates, is tender, and becomes palatable and the most easily digestible, but, if heated beyond this point, in proportion to the degree applied, becomes tough and indigestible. Thus, in the so-called "soft boiled" egg, i. e., one that has been kept a short time in water at 212 degrees, there is a tough layer next the shell, and a soft digestible center; but the "hard boiled" egg, one that has remained in the water until every part of it has undergone the action of the boiling temperature, is all tough, and hard to digest; and an egg cooked in a temperature of 400 degrees becomes so tough and hard as to be good marble cement, but wholly unfit for food.

Soft Boiled Eggs.—To prepare soft eggs for the sick, since it is difficult to maintain an even temperature of 160 degrees, place them in a basin on a part of the stove that has but little warmth, pour over them boiling water, a pint for each egg, and leave them uncovered eight minutes.

To Poach Eggs.—Let a basin of water come to a simmering heat, never to the boiling point, add a teaspoonful of salt, carefully break in the eggs, dip the water over them until the whites are firm and films form over the yolks, remove with a skimmer, add a little butter to each, salt and pepper to the taste, and serve while hot.

Fried Eggs.—Like every other kind of fried food, fried eggs are unfit for the sick.

To Cook Starchy Foods.—To properly cook starch requires

a great deal of heat, for the object now to be attained is the bursting of the woody envelope covering each individual granule, thus setting free its elements, that, when eaten, they can be readily acted upon by the saliva—the fluid which digests starch by changing it into sugar. Starch itself will not pass through the membrane lining the alimentary canal, into the blood, and has to undergo this chemical change into sugar before its ingredients can be absorbed. Hence, the importance of well-baked bread, well-cooked potatoes, in fact, of all starchy foods being cooked so long and well as to thoroughly break up all their granules. Indeed, unless well cooked, a large portion of such food passes through the body unchanged, doing a healthy person no good, a sick one positive harm. Because of the greater heat obtained in the roasting process, a roasted potato is more easily digested than a boiled one. The more easily digestible a food can be made the better, and this end should always be especially sought in cooking for the sick.

Diet in Disease.—In disease the diet should, of course, be restricted. In this the appetite of the patient is usually, but not always, a safe guide. In apathetic states, as of typhoid, the attendant should not wait until the patient calls for food or drink, and in such diseases as consumption, more than the appetite demands may be eaten with benefit. On the other hand, in convalescence from fevers and other wasting diseases, the nurse must see that the patient does not eat too much, and be slow in increasing the food. She must also be slow in changing from a liquid to a solid diet, and in so doing be extremely careful, for the first day or two, giving, besides the liquid, only a piece of buttered toast as large as the two fingers, with a little tea or cocoa, every three hours; and she must carefully guard the patient from getting food at any other time, since the craving for nourishment is likely to be so great as to quite overcome his judgment, and the condition of the system such that even a little of seemingly harmless food might cost him his life.

Fevers and Inflammations.—The best food in these cases, as well as in many others, is milk. If it irritates the stomach, it should be scalded, or diluted with one-third its bulk of lime-water, or, what is often much better, should be peptonized (by which we mean the addition of artificial pepsin to the milk, thus producing a change before it is taken that naturally occurs after

it reaches the stomach). Pepsin tubes with full directions can be bought at any drug store. Milk alone will sustain life indefinitely. It is especially suitable food in typhoid and scarlet fevers, and may be given there alone. It should not be gulped down in large quantities, but sipped or eaten slowly with a spoon, since, if taken too rapidly to mix with the digestive juices, a curd is likely to form upon the outside of the mass, in which condition it may lie in the stomach for hours as a plastic, indigestible ball. If properly administered, neither beef teas nor extracts are so useful, or as easily digested, but beef tea must sometimes be given as the next best resort.

Beef Tea.—As often prepared, beef tea is worthless as an article of diet. Bartholow gives the following recipe for its proper preparation: "A pound of lean beef should be freed from all bone, cartilage, fat, tendon, vessels and refuse of every kind; chopped fine, and digested for two hours in a pint of cold water. It should then simmer, but not boil, on the stove for three hours, cold water being added if necessary to keep the amount up to a pint. It should then be strained, and the beef pressed. Two ounces of this liquid every three hours is a suitable quantity for an adult."

Beef Juice.—The various beef extracts put up by the large packing companies and other firms are nutritious and useful, but inferior to fresh beef juice. Other meat juices are also inferior. Chicken broth ranks next to beef, and then comes that of veal. A good method of preparing beef juice is as follows: "Select a good piece of round steak, free it from all fat, refuse, etc., season to the taste and broil slightly on both sides in a hot skillet, then press out the juice with a meat press or lemon squeezer. Give from two teaspoonfuls to two tablespoonfuls, according to the condition of the patient, once in three hours. It should be remembered, however, that beef juice is more of a stimulant than it is a food, because so difficult of digestion as to really be of little value in many cases. If it nauseates the patient, it should be frozen like ice cream, in which form it is very palatable.

Barley Water and egg-nog are other foods. To prepare barley water: "Wash two ounces of pearl barley, add fresh water, boil five minutes, and pour off the water; then pour on two quarts of boiling water, and boil down to one quart. Flavor to the taste, but do not strain."

Egg-nog.—“Scald some milk and let it cool; beat up a fresh egg with granulated sugar in a tumbler; and having beaten it to a froth, add a dessertspoonful of brandy, and fill up with milk.”

Egg-nog.—Separate the egg, and whip up the yolk with a teaspoonful of sugar and about a third of a glass of milk or cream; the latter is better because more digestible; then beat in from a teaspoonful to two ounces of whisky, or leave out the whisky and flavor with lemon or vanilla if preferred; whip the white separately and place it on the other, grate a little nutmeg on top and serve immediately. An egg-nog should not be allowed to stand after it is made, since the egg and milk both lose some of their freshness by exposure to the air.

Milk Punch.—Into a cup of milk, sweetened with a teaspoonful of sugar, stir two tablespoonfuls of brandy and pour from glass to glass, or shake in a lemonade shaker, to thoroughly mix, then grate a little nutmeg on top and serve.

Some prefer to cool a cup of milk with cracked or shaved ice and add enough sugar to make it quite sweet; shake to a good foam in a lemonade shaker, add two tablespoonfuls of brandy and one or two teaspoonfuls of Jamaica rum, and serve while cold.

Milk Lemonade.—Into one-fourth cup each of lemon juice and sherry and one tablespoonful of sugar, pour a cup of boiling water, stir thoroughly, then add one and a fourth cups of milk, stir until curdled, strain through linen, and cool by placing on ice.

In Wasting Diseases.—In wasting diseases, as cancer or consumption, both classes of foods are required, the proteids to replace the rapidly disappearing tissues, and fats and starches to maintain waning strength. The fats are more valuable here than the starches and sugars, because more readily assimilated. Those most useful are fat meats (except pork), butter, cream and olive oil. Cod liver oil is also very useful, for although a medicine it is also a food. In these conditions the malt liquors may also be given to advantage, but they are of more benefit in aiding digestion and assimilation than they are as foods. They have a peculiar power of converting starches and sugars into fats. In these diseases the quantity of food should be large, more than the appetite demands.

In Diseases of the Stomach and Bowels.—In these diseases the least amount of food consistent with strength should be taken. In severe acute cases it is often well to withhold all food for forty-

eight hours, and in some cases it is necessary to resort to rectal feeding—an excellent way of supplying nourishment and keeping up the strength of the patient when, because of stomach irritability, he is unable to retain food taken by the mouth. It should begin early in acute diseases, but only when advised by a physician. It is done by injecting into the rectum predigested food, as peptonized milk, an egg beaten up in peptonized milk, or some other easily digested liquid food, by means of a syringe. It may be repeated once in four hours. The hips should be raised a little to assist the patient in retaining it, and once or twice each day, shortly before a feeding, the bowel should be cleansed by an injection of soap and water. Of course, rectal feeding is never to be administered in rectal diseases. In diseases of the stomach, starches may be given since they are digested in the intestines; but in diseases of the intestines give proteids for they are mostly digested in the stomach. Scalded milk, milk and lime water, or better milk and pepsin, lemonade, barley water and albumen water may be given.

Albumen Water or Egg Water is prepared as follows: "To the white of one fresh egg add half a pint of cold water previously boiled, a little sugar and one teaspoonful of brandy; shake thoroughly and feed cold." It is a very useful food in the digestive troubles of infants. In these cases milk is not as good a food and it should be peptonized. Of milks, the human milk is best, and cows' milk is next. Condensed milk and the many varieties of "Infant's Food" on the market are all inferior. Although infants reared on them often look fat and hearty, they are not really strong, and readily succumb to diarrheas and other diseases.

Miscellaneous.—In diabetes all sugars and starches should be avoided as the plague. The diet must consist of the proteids.

Diseases of the liver and kidneys, as a rule, are benefited by a liquid diet. Milk is superior here to all other articles, and skimmed milk is often better than new milk.

Patients suffering from scurvy, as is well known, rapidly improve on a diet which includes fresh vegetables.

In rickets the food should contain lime and other minerals. Unbolted wheat flour and oatmeal contain these elements in comparatively large proportions.

In rheumatism, gout, and similar diseases, vegetables and

acid fruits are beneficial. Animal foods and sweet substances should be avoided.

Constipation can usually be overcome by proper food. Oils, fats, bulky foods, fruits and vegetables are the diet for such cases.

Patients suffering from scrofula, continued suppuration and joint disease should have a plentiful diet, including unbolted flours and meals, both lean and fat meats, cod liver oil, cocoa, milk and eggs.

Nursing mothers who do not furnish sufficient milk should drink milk, cocoa and beer, and eat fatty and oily foods.

The Administration of Food.—Let there be nothing lukewarm. Serve hot foods hot, and cold foods cold. They should be clean, daintily prepared, and brought promptly at the time prescribed. Give the patient all the time he wants that he may eat slowly, but as soon as he has finished, remove all dishes and remnants to avoid unpleasant sights and odors. Never ask a sick person what he wants to eat. If he calls for a certain kind of food, and the physician consents, give it the preference in preparing his meal, otherwise, try to make each bill of fare a surprise to him, and so change it from day to day as to give variety and relish.

BILLS OF FARE FOR THE CONVALESCENT.

Since personal tastes differ greatly, especially in the sick, it is often extremely difficult to prescribe a diet that shall be palatable and at the same time best for the patient, but the bill of fare must contain only such articles as are nutritious and easily digestible, even though abnormal cravings have to be restrained. The following outline may serve as a guide for a week during convalescence and, with such variations as will be likely to suggest themselves to the nurse, may be a help thereafter. Due care must, of course, always be taken not to give any article of food contraindicated by the patient's disease.

FIRST DAY.

Breakfast.—Beef broth with bread crumbs.

Lunch.—Egg-nog.

Dinner.—Raw oysters; crackers and butter; a glass of sherry.

Lunch.—Hot beef tea.

Supper.—Cream toast; jelly; cocoa.

SECOND DAY.

Breakfast.—Granose with sugar and cream; cup of chocolate.

Lunch.—Glass of milk.

Dinner.—Small piece of broiled bass or crappie; a baked Irish potato; bread and butter.

Lunch.—Cup of custard with cream.

Supper.—Milk toast; jelly; tea.

THIRD DAY.

Breakfast.—Poached egg; bread and butter; coffee.

Lunch.—Egg-nog.

Dinner.—Mutton soup; tender sweet breads; whipped cream; light wine.

Lunch.—Beef tea.

Supper.—Raw oysters; bread and butter; chocolate.

FOURTH DAY.

Breakfast.—Oatmeal with sugar and cream; lamb chop; cream potatoes; bread and butter; coffee.

Lunch.—Glass of milk.

Dinner.—Chicken soup; baked potato; bread; tapioca cream.

Lunch.—Custard with cream.

Supper.—Buttered toast; currant jelly; wafers; cocoa.

FIFTH DAY.

Breakfast.—An orange; soft boiled egg; wheat germ, with sugar and cream; soft buttered toast; coffee.

Lunch.—Hot beef tea.

Dinner.—Mutton soup; small rare piece of tender steak; baked potato; rice pudding; bread.

Lunch.—Milk punch.

Supper.—Calf's foot jelly; raw oysters; bread and butter; tea.

SIXTH DAY.

Breakfast.—Granose with sugar and cream; poached eggs on toast; coffee.

Lunch.—Chicken broth with crackers.

Dinner.—Beef soup; small piece of breast of roast chicken; baked potato; whipped cream; bread.

Lunch.—Glass of milk.

Supper.—Baked apples; raw oysters; bread and butter; grape jelly; cocoa.

SEVENTH DAY.

Breakfast.—An orange; oatmeal and cream; scrambled egg; buttered toast; coffee.

Lunch.—Hot beef tea.

Dinner.—Chicken soup; a little tender roast beef; creamed potatoes; tapioca pudding; bread.

Lunch.—Cup of custard.

Supper.—Sponge cake with cream; buttered toast; apple jelly; tea.

EMERGENCIES.

By LOUIS C. DUNCAN, M.D.

CHAPTER I.

POISONING.

Knowledge of poisons is older than history. 'The first people known to have used them were the Egyptians, who probably obtained the basis of their knowledge from the Chaldeans. The Chinese and Hindus were acquainted with them as early as 900 B. C.; and among the Greeks, and other contemporaneous peoples, they were so often used that it was customary for cup-bearers to taste beverages in his presence before presenting them to the king. The death of Socrates by hemlock in 339 B. C. is known by every school boy, and in Rome also poisons were much used as a means of getting rid of obnoxious persons.

During the middle ages the study of poisons was ignored; partly because it was not an age of study, and partly because the dagger and ax were weapons better suited to the boid spirits of the time; for, be it remembered, poisons in those days were not employed for the healing of disease, but were used as poisons only, either to rid one of his enemies or to rid himself of the incubus of life when it had become no longer endurable.

In ancient times life was thought to be a mysterious something which inhabited the body, and took flight on the entrance of another mysterious something called a poison, but if still another mysterious something, called an antidote, could be introduced in time, the poison might be thwarted and life remain. The same idea prevailed in regard to all diseases; they were entities in some way to be driven out. If these views are held by any now, let us say that there is no more mystery about disease and poisons than about paint wearing off a house, shingles blowing from a roof, or rats gnawing holes through partitions; and there is no more mystery about antidotes and other curatives than there is about repairing the house with paint, shingles and plaster.

With the advent of reason and logic in the study of physi-

ology and medicine, came a gradual change in our views of life, disease and death. From patient investigation, by thousands of scientific men, it has been learned that poisons do not act in a mysterious way, but in a very certain and definite manner, which may be known and as certainly counteracted. When the physical life ceases it does so from a cause; some part fails. For example: A person takes a poisonous dose of aconite; perhaps a teaspoonful of the tincture. If he receives no aid his life will soon be extinguished, not in a mysterious way, but because aconite weakens and slows the heart until it is stopped. Now what could be more simple or logical than to give this patient something, as strychnia, that will stimulate the heart and keep it going until the body eliminates the aconite? And so, although there is a legion of them, by careful study and experiment, an antidote has been found for every poison.

Taking the word in its broadest sense, there are three classes of antidotes: First—The remedies or means of getting the poison out of the body; such as the stomach tube, emetics, physics, etc.

Second—The chemical antidotes—drugs which unite with the poison, while yet in the stomach and render it harmless. Thus, in case an alkali has been swallowed, an acid may be given as a chemical antidote.

Third—The physiological antidotes—the drugs or measures which have the opposite effect on the functions of the body from that of the poison, an example of which is given above.

MODERN USES OF POISONS.

Formerly poisons were used as poisons only, but to-day the most deadly of them are used in the arts and sciences, as medicines, and in the affairs of every-day life. Consequently we have a large number of accidental poisonings; in fact, they exceed all others. It should be remembered that many of the well known drugs are poisonous, if taken in quantities larger than the medicinal dose.

Some physicians, using vegetable remedies exclusively, strive to inculcate the idea that minerals are poisonous and that vegetables are not, merely to advance their own merits at the expense of those employing all remedies of known virtue, no matter from what kingdom they have come. To refute the fallacy it is only necessary to mention such vegetable remedies as aconite, strychn-

nia, belladonna, opium and conium, each a poison of well known power, and that most deadly of all common poisons, hydrocyanic acid, found in the kernels and leaves of the ordinary peach tree.

A person may be poisoned in a variety of ways.

First.—By swallowing some poisonous substance. This is the most frequent.

Second.—By inhaling a poison, such as illuminating gas which annually numbers its victims by hundreds.

Third.—By the absorption of poisons, as in the case of lead poisoning of painters. The other methods are so rare as to be of little importance.

It is impossible to say just what is the smallest quantity of any poison that will produce death. That depends upon the age, weight and condition of the system, contents of the stomach and the peculiar constitution of the person. The administration of two grains of arsenic has proven fatal, while persons have taken as much as an ounce and recovered. In treating the various poisons the medicinal dose of each will be named. Any quantity larger than that is dangerous.

SPECIAL POISONS.

Mineral Acids.—Sulphuric acid, hydrochloric (or muriatic) acid, and nitric acid.

These acids may be described as one, since they all produce the same symptoms and require the same treatment. They are not given as medicines until diluted so as to contain only about ten per cent of the pure acids, in which state they are known as dilute acids.

The dose of dilute sulphuric acid is from five to ten drops.

The dose of dilute nitric acid is from five to fifteen drops.

The dose of dilute hydrochloric acid is from five to twenty drops.

Symptoms of Mineral Acid Poisoning.—Severe burning pain in the mouth, throat and stomach immediately after swallowing the acid. The pain afterward extends over the abdomen and chest, and becomes excruciating agony. Stains will very soon be observed about the mouth and throat—sulphuric acid producing a gray stain that gradually becomes brown; nitric acid a bright yellow; and hydrochloric acid either a whitish stain or none at all. Vomiting occurs without relieving the pain.

Breathing is difficult; swallowing is difficult and painful; collapse. Death may result in a few hours or in several days. Hydrochloric acid is liable to produce suffocation. About 78 per cent of the patients recover, but in these strictures of the stomach and esophagus often remain.

Treatment.—For the purposes of treatment it is not necessary to distinguish between the three acids. The treatment should begin at once. Milk in large quantities is one of the best antidotes. Magnesia, chalk, soda, soapsuds, or lime-water from fresh lime may be given. If none of the remedies are at hand lime-water may be prepared from lime scraped from a plastered wall. Being alkalies these substances neutralize the acids. Do not give an emetic. Small pieces of ice relieve thirst and pain. Opiates may be necessary when ice will not suffice. In collapse give stimulants, such as whisky or brandy, and apply heat by hot water bottles, hot sandbags, etc.

ALKALIES.

The most important alkalies are caustic soda and caustic potash. The latter is the principal constituent of the lye used for soap-making and scouring. Every community has its case of a child that has swallowed lye. Adults are rarely poisoned by it.

Symptoms.—A soapy taste in the mouth, followed by violent burning pain; the parts are swollen and stained; at first white, then red or brown. Vomiting occurs; at first thick and slimy, later dark or tinged with blood. The matter vomited contains shreds of tissue from the throat and stomach and is alkaline. Perforation of the stomach, with peritonitis, collapse, or suffocation may cause death within twenty-four hours, but most cases do not result in death at once. About twenty-five per cent of all cases recover. The majority die in from one month to two years, from lack of nutrition, caused by stricture of the esophagus or stomach. Of late years these strictures are relieved by a skillful surgical operation.

Treatment.—One of the best antidotes for the alkalies is vinegar. It should be diluted with water until it can be taken as drink. Citric acid, or lemon juice, diluted, will also neutralize them. After these, olive oil, milk or eggs are useful. They unite with the alkali to form a harmless soapy mixture. Do not give emetics. Treat pain and collapse as in acid poisoning. If the patient survives, there will probably be strictures of the esophagus that will require surgical treatment.

AMMONIA.

Symptoms.—Same as those for the alkalies.

For treatment give dilute vinegar or lemon juice. These are better if mixed with oil. The later results must be treated by a physician.

ARSENIC.

Acute Arsenical Poisoning.—Arsenic occurs in the following compounds: Arsenic trioxide, the ordinary white arsenic, and the so-called arsenious acid sold in the shops. The medicinal dose is from $\frac{1}{10}$ to $\frac{1}{12}$ of a grain.

Fowler's solution of arsenic; dose from two to eight drops.

Rough on rats contains ninety-six per cent of pure arsenic.

Nearly all fly papers and fly poisons.

Paris green and London purple.

Wall papers colored with arsenical colors.

Candies colored with arsenical colors.

Impure subnitrate of bismuth.

The fact that arsenic is practically tasteless accounts for its frequent use in homicidal poisonings.

Symptoms.—The first symptoms of arsenical poisoning do not usually appear until from thirty minutes to an hour after the poison has been swallowed, though they may come on in a few minutes, or after several hours. Rapid appearance of symptoms indicates a large dose and a dangerous case. The average duration of a fatal case is twenty-nine hours. The symptoms of arsenical poisoning vary more in different cases than those of any other poison. Only the most common can be given here.

There is first a feeling of faintness and nausea. Vomiting soon begins and increases in frequency and retching continues, even after the stomach has been entirely emptied. The first matter vomited is food, then watery and mucous substances, tinted often with blood, and nearly always colored green with bile. Vomiting is followed by pain, beginning in the stomach, then spreading over the abdomen and going through the back. This pain is sometimes said to feel "like a red hot coal in the stomach." Throat dry and parched and constricted with great thirst. Drinking increases pain and nausea. Later purging comes on with griping and straining. The stools are at first dark colored and fetid, but later resemble the rice water discharges of cholera.

Great prostration and collapse follow. The skin becomes cold and clammy. There are fainting spells and convulsions. Death, which occurs in about twenty-four hours, is quiet, the mind being clear to the last.

In some cases after twenty-four to forty-eight hours the patient appears to be relieved and a recovery is looked for, but instead he gradually sinks and dies in from three to ten days. In other cases the patient soon becomes unconscious and remains so until death, which, in these cases, usually takes place in from four to eight hours.

In this connection it is necessary to say that one may become accustomed to taking arsenic, by gradually increasing the dose, until a large amount may be taken with safety. There are people who habitually eat arsenic, either to improve the complexion and personal appearance, or in mountainous regions to improve "the wind" for climbing the mountains. Such a person has been known to eat three or four grains a day, for nearly a lifetime, without bad results.

Treatment.—First—Empty the stomach either by a stomach tube or such emetics as zinc sulphate or ipecac, but never give tartar emetic. Second—Convert what is left into a harmless compound. This is best done by ferric hydroxide, which is found at the drug stores. A physician should be summoned at once. Meantime the giving of milk, melted butter, or lard, and stimulants will be of service. Arsenical poisoning cannot be well treated by other than a skillful physician.

Chronic Arsenical Poisoning.—These cases occur from taking arsenic too long in medicinal form, sometimes from a single large dose, in those working with arsenical compounds, and those living in rooms papered with arsenical paper. There are also cases where repeated small doses are given for a homicidal purpose.

Symptoms.—Indigestion with vomiting, but little pain; headache; fever resembling typhoid; red patches on the skin; redness and puffy appearance of the eyelids; cold in the head; sore throat; scaling of the skin and falling out of the hair; numbness in the hands and feet. Later there is weakness of the feet and legs, and finally complete paralysis. Death occurs from heart failure.

Treatment.—Stop the arsenic and give iodide of potash in

doses of ten to twenty grains, three times a day. There may be various injuries which will make necessary the presence of a physician.

LEAD POISONING.

Acute.—Most cases of lead poisoning are accidental, and are chronic rather than acute. Lead is found in:

Lead acetate, or sugar of lead, used medicinally, lead subacetate, or lead water, and in lead carbonate, or white lead, used in painting.

Symptoms.—Sweet metallic taste; other symptoms follow in a few minutes, but may be delayed an hour or more if the stomach be full. Vomiting begins early, is continuous and is increased by drinking, which is resorted to for the exceeding thirst. There is a colicky, abdominal pain that is characteristic of lead poisoning. The tongue becomes coated and the breath has a sweetish, fetid odor. Headache, sleeplessness and cramps follow and the strength gradually diminishes.

Treatment.—1. Empty the stomach either by a stomach tube or an emetic.

2. Give Epsom salts in large quantities, and opiates for pain. Iodide of potash will aid in eliminating the poison from the system; it may be given in doses of from ten to twenty grains three times a day.

The patient should be kept upon a fluid diet.

Chronic.—Chronic lead poisoning occurs in persons handling lead, as painters, smelters and workers in chemical establishments.

Symptoms.—Abdominal pains of a colicky nature commonly known as "painter's colic;" a bluish line on the gums at the margin of the teeth; constipation; headaches, paralysis—especially of the extensor muscles of the wrist and fingers (wrist drop), so that the patient is unable to lift the hand or straighten the fingers. In some cases the arm cannot be raised.

Treatment.—Remove the source of poisoning and give iodide of potash in doses of ten to twenty grains three times a day, to eliminate the poison. Morphine may be necessary to relieve the colic, in which case it may be given in doses of one-tenth to one-half grain once an hour.

MERCURY.

Forms.—Metallic mercury, not poisonous.

Mercuric chloride—calomel, rarely poisonous if pure. Dose, up to ten grains.

Mercurous chloride—bichloride of mercury or corrosive sublimate, frequently used as a disinfectant and bug exterminator, very poisonous. Medicinal dose, up to one-tenth of a grain.

Red oxide of mercury—red precipitate; used in ointments.

Sulphide of mercury—vermilion; used as a color.

Symptoms.—On swallowing a mercurial poison there is an acrid metallic taste in the mouth that cannot be concealed, and in a very few minutes a sensation of heat in the throat and stomach. In from three to ten minutes violent vomiting begins, and continues for several hours. The vomited material has a gray, mucus-like appearance, with shreds of tissue. Soon there is purging of copious, liquid, bloody, fetid passages, with pain and straining. The usual duration of a fatal case is from five to twelve days.

On the second or third day there is salivation, with sore mouth, loose teeth and ulceration of the gums. The pulse becomes small and fast, and the temperature is below normal, sometimes going as low as 93 degrees Fahrenheit. Later there are paralyses, convulsions, and collapse preceding death. In cases that recover there is inflammation of the stomach and bowels that may last for several weeks.

Treatment.—1. Give albumen, such as white of egg, and milk in large quantities, to unite with the mercury and for a time render it harmless.

2. Then give emetics. 3. Next give stimulants, as whisky or brandy. 4. Iodide of potash will help get the mercury out of the system, and ten drop doses of tincture of belladonna, three times a day, will help the salivation.

PHOSPHORUS.

Cases of phosphoric poisoning are quite rare because of the decided odor and taste of the drug, and its luminous appearance in the dark. Phosphorus is found in some rat and vermin poisons, and on the tips of matches, and from these sources there are occasional cases of poisoning. Cases are on record in which fatal poisoning resulted from anointing the hands and face with

phosphoric paste, for the purposes of "dark seances." Medicinal poisoning with phosphorus is extremely rare. The dose is one-thirtieth of a grain, or less.

Symptoms.—First Stage.—After an interval of from two to six hours pain in the stomach, of a burning character, comes on, and there is headache, great thirst and low temperature. Belching occurs, and the odor of phosphorus is easily detected in the breath. Nausea and vomiting follow with plain evidence of phosphorus. Later there is purging. After two or three days there is an apparent recovery, and the patient seems better for perhaps a week, then comes the second stage in which the former symptoms reappear, with pain in the region of the liver, with marked jaundice; headache, fever and unconsciousness follow, and death results from exhaustion.

Treatment.—Owing to the late appearance of symptoms there is more time for treatment. Wash out the stomach by means of a tube, or give of sulphate of copper fifteen grains. Physics should be given later. No oils or fats should be given until recovery is complete.

CHAPTER II.

ACONITE.

(Monkshead, Wolfsbane, Blue Rocket).

Aconite is a vegetable preparation used in medicine, especially by eclectics and homeopaths. Dose of the tincture, five to fifteen drops.

Symptoms.—Aconite acts rapidly if taken in a poisonous dose, the average duration of fatal cases being less than five hours. In a very few minutes there is a prickling sensation and feeling of numbness about the mouth that soon spreads over the entire surface of the body, and is especially noticeable in the hands and feet. The throat is dry and seems swollen, and there is a horrible choking sensation, which is spasmodic like hydrophobia, when the patient tries to swallow; salivation; vomiting, violent and continuous and of an explosive character; the pulse becomes slow, irregular and flickering; breathing is shallow and difficult. The patient is pale, prostrated and fearful; with blue lips, clammy skin and a low temperature. The eyes stare and the pupils are dilated. The patient may or may not be conscious. Death occurs in a fainting spell.

Treatment.—An emetic of zinc sulphate should be given; or preferably the stomach should be washed out with a solution of iodine in iodide of potash by a stomach tube.

The breathing should be kept up by applying to the nostrils camphor or ammonia, or by artificial respiration. Heart stimulants, as strychnia, digitalis or atropia, are necessary. Nitrite of amyl is also useful. The extremities should be kept warm by hot bottles, rubbing, etc.

THE BELLADONNA GROUP.

There are several vegetable poisons that are very closely allied, and may be spoken of together. They are:

Belladonna, or deadly nightshade, dose of the tincture, five to thirty drops.

Atropine—a preparation from belladonna.

Stramonium—thorn apple, or jimson weed, a common weed in the central and western states.

Hyoscyamus, or henbane.

Poisoning occurs from taking the drugs by mistake, or in children from eating the berries of the weeds of this group. The deadly nightshade bears berries resembling those of a similar plant, known to country children as ground cherries, and eaten by them.

Symptoms.—Dizziness; dryness of mouth and throat; no saliva; thirst; redness of skin, with heat, itching and dryness; eyes staring with pupils widely dilated; noisy delirium. The patient has hallucinations of all kinds and has to be restrained. He talks constantly in a nonsensical way.

The delirium gradually subsides and the patient, if he does not recover, passes into a stupor, with slow snoring breathing and very weak pulse, from which he never awakes.

Treatment.—Wash out the stomach or give an emetic. Morphine given hypodermically is a physiological antidote.

Tendency to sleep should be combated, as in opium poisoning, by walking and slapping, also by brandy, nitrite of amyl and artificial respiration.

HYDROCYANIC ACID.

(Prussic Acid).

This substance is found in bitter almonds, the kernels of the peach, cherry, plum and other fruit tree seeds, in the bark and leaves of many plants, in the cyanide of potash used in photography, and in Prussian blue and other chemicals. The medicinal preparation contains but two per cent of the pure acid and the dose is from two to eight drops. Cases of poisoning in children, from eating quantities of peach or other kernels, are not rare.

Hydrocyanic acid is the most deadly of all ordinary poisons. Of 455 reported cases, eighty-four per cent resulted fatally, and the average time from taking the poison until death was only half an hour. In a large number of the cases death occurred in less than five minutes. Whatever is done for hydrocyanic poisoning must, indeed, be done quickly. In most cases the physician arrives too late to be of any service.

Symptoms.—If a large dose be taken, consciousness is lost almost at once and the patient falls to the ground. There are slight convulsive movements, then he lies still in a state of col-

lapse, breathing only at intervals, and in a few minutes the breath stops entirely. For such cases treatment is generally useless.

If the dose was smaller there are a hot, bitter taste and a choking sensation. Then come severe headache, dizziness, mental confusion, insensibility and loss of all muscular power. The face is pale, though full; the eyes staring, glassy and rolled upward. There is frothing at the mouth and convulsions, resembling those of lockjaw. The patient does not vomit.

Treatment.—If peach or other kernels have been swallowed, give an emetic, as zinc sulphate.

Artificial respiration should always be practiced, as in cases of drowning, and the breathing may be stimulated by holding to the nostrils camphor or ammonia. Such stimulants as whisky, or other spirits, and strychnia are very useful. If the acid has been taken by the mouth the stomach should be washed out with a solution, either of permanganate of potash or peroxide of hydrogen.

The electric current is a good stimulant for the heart. If the patient can be tided over the first half hour he is probably safe.

CONIUM.

(Poison or Spotted Hemlock).

Although this plant grows abundantly in some parts of America, poisoning from it in this country comes principally from the medicinal preparations, and is somewhat rare.

Symptoms.—Loss of muscular power, beginning in the legs; staggering gait; drooping eyelids; dilated pupils; some nausea but no vomiting; speech becomes difficult and is finally lost; swallowing is difficult; the mind remains clear to the last. Death results from paralysis of the muscles of respiration.

Treatment.—Remove the poison from the stomach by zinc sulphate, mustard, or any other emetic, and stimulate by hot applications to the spine, and by the use of spirits, and perform artificial respiration, as in cases of drowning.

OPIUM AND OPIATES.

Opium is obtained from the juice of the poppy. It is found in the following preparations:

Extract of opium. Dose—From one-half to two grains.

Dover's powder contains ten per cent of opium. Dose—Five to fifteen grains.

Tincture of opium, or laudanum. Dose.—Five to thirty drops.

Camphorated tincture of opium, or paregoric. Dose—Five to sixty drops.

Morphine. Dose—One-tenth to one-half grain.

Codeine. Dose—One-sixth to one grain.

A large number of proprietary nostrums, such as soothing syrups, pectoral syrups, cough syrups, bronchial troches, etc., contain morphine as their principal ingredient. From thirty-five to forty per cent of all cases of poisoning are by opiates. Infants and young children are especially susceptible to their poisonous qualities. The action of morphine is more diminished by habit than that of any other poison. De Quincey relates that at one time he took nine ounces of laudanum daily. Another “fiend” took 120 grains of morphine at a single dose without ill effects.

Symptoms of Opium Poisoning.—After an interval of from thirty minutes to an hour the patient becomes excited and restless, talks fluently and pleasantly, and moves about much. This is known as the stage of excitement and lasts but a few minutes. It is absent in habitues. Then comes a period of drowsiness and diminished sensibilities. There is a sensation of weight in the extremities, and the desire to sleep is irresistible. At first the sleep is normal and the patient may be aroused. The skin is pale and the pupils contracted. The patient passes into a deep, heavy sleep (coma) from which he cannot be awakened. He lies perfectly motionless with eyes closed, their pupils the size of a pinhead; the skin pale and moist; lower jaw drooping, and the muscles completely relaxed. The respiration is slow, shallow and snoring. The tongue falls back in the throat and mucus accumulates there, causing the rales popularly known as the “death rattle.” The body cools rapidly and, if treatment is not successful, death takes place in from twelve to twenty-four hours. If, after the deep sleep, the treatment is so far successful that the patient can be aroused recovery will probably be made, although he may remain asleep from twenty-four to thirty-six hours longer.

Treatment.—First remove the poison from the stomach by the use of emetics. If possible arouse the patient by slapping with wet towels, or by an electric current, then *keep him awake* by walking him between two persons. Strong coffee, or caffeine in one grain doses, is useful. Strychnia (one-fortieth of a grain) is

a good heart tonic, and if breathing fails artificial respiration should be kept up, for hours if necessary. As the patient does not pass urine, the bladder should be watched and the urine drawn with a catheter.

COPPER.

Found in:

Cupric sulphate or blue vitriol or blue stone; medicinal dose, as an emetic, ten to fifteen grains.

Verdigris, a mixture of copper acetates, sometimes found on copper or brass vessels, containing acid substances.

Cases of poisoning from copper are rare. While it is possible that poisoning may occur from eating food that has stood in copper vessels, most such cases are really poisoning from bacteria, ptomains, or trichinae.

Symptoms.—Pain in the stomach, extending over the abdomen, accompanied by vomiting of greenish matter. There is also purging, with frequent scanty urination. The urine is almost black. There are cramps in the legs, weakness and headache. There may be a decided improvement followed by relapse. The average duration of fatal cases is fifty hours.

Little can be done except by a physician. If the stomach has not already been emptied, emetics should be given; then give milk or eggs. Soap and soda are chemical antidotes. Stimulants, such as whisky or brandy, may be necessary.

COCAINE.

Symptoms.—Restlessness and excitement, dizziness, headache, delirium, difficult breathing, rapid feeble pulse and dilated pupils. Most cases end in recovery.

Treatment.—Strong coffee, or caffeine in one grain doses every hour, nitrite of amyl by inhalation, and stimulation by whisky, brandy, etc.

NICOTINE.

Nicotine is an alkaloid of tobacco. Its action may be as rapid as that of hydrocyanic acid. Death has occurred from it in less than five minutes.

Symptoms.—Faintness, nausea and vomiting, headache, dimness of vision, deafness, drowsiness and fainting spells. The pulse is rapid and weak, the breathing quick and the skin cold.

Treatment.—Place the patient in bed and empty the stomach by a tube or emetic; then give tannin in twenty grain doses every two hours; or strychnia in one-fortieth of a grain doses once in two hours; or stimulants, as whisky or brandy, and apply heat to the hands and feet.

STRYCHNIA AND NUX VOMICA.

Strychnia is the active principle of nux vomica. Dose.—From one one-hundredth to one-fortieth of a grain.

Tincture of nux vomica. Dose.—From five to twenty drops.

Cases of strychnia poisoning are common, both accidental and intentional. Strychnia has been mistaken for quinine, calomel, etc., and children have been poisoned by eating animal poisons containing strychnia. The least amount of strychnia that will cause death is one-half grain, in a healthy adult. In fatal cases death usually occurs within one hour, is rarely delayed beyond two hours, and may occur within a few minutes. If the patient survives two hours, recovery is probable.

Symptoms.—A bitter, hot taste is noticed on swallowing the poison. In a short time, usually ten to twenty minutes, spasms begin. At first there are twitchings of the muscles, followed by violent convulsions, resembling those of lockjaw. During the spasm every muscle is contracted and the head is drawn backward, the jaws are locked, and the eyes protrude with dilated pupils. There is frothing at the mouth, swelling of the neck and a hideous distortion of the features. This spasm passes off, but is followed by others at shortening intervals. The spasm lasts from thirty seconds to ten minutes, and there may be from one to ten of them. In fatal cases death usually occurs in the fourth or fifth spasm. The whole course closely resembles that of lockjaw.

Treatment.—Owing to the short time available for aid, a physician should be summoned at once, if within call. Meantime the stomach should be emptied by emetics or other means; then chloral in fifteen grain doses every fifteen minutes, or chloroform by inhalation, are the best remedies.

Tannin in twenty grain doses every hour will do some good, or whisky may be given to the point of intoxication. Opium or morphine should be given only when no other antidotes can be obtained. The patient should be kept perfectly quiet, in a dark room, undisturbed by noise or sudden movements of attendants. Artificial respiration may be necessary. (See page 196.)

DIGITALIS.

(Foxglove.)

Dose of the tincture, from one to five drops.

Symptoms.—Vomiting and purging of green material, followed by headache, delirium and convulsions. The skin is cold and clammy and the pupils of the eyes are dilated. Death occurs suddenly from heart failure.

Treatment.—Keep the patient lying down, empty the stomach by emetics and give tannic acid every hour in twenty grain doses. Stimulate by heat applied to the hands, feet and limbs and over the heart, and by strong, hot coffee or whisky.

CHLORAL, OR CHLORAL HYDRATE.

Dose, from five to thirty grains.

Symptoms.—Immediate burning pain in the mouth, throat and stomach. After a short period of excitement the patient sinks into a deep sleep, which in fatal cases may last seventy-two hours. In fatal cases the sleep deepens into coma, with snoring breathing, muscular relaxation, cold skin and failing pulse and respiration.

Treatment.—Empty the stomach by tube or emetics and apply heat to the body. Try to rouse the patient and stimulate with ammonia by inhalation, electricity, or strychnia in one-fortieth grain doses every two hours.

CARBOLIC ACID, OR PHENOL.

Symptoms.—The symptoms appear quickly. There is burning of the mouth and throat, producing a white stain that afterward turns red. Vomiting, with the odor of carbolic acid, may occur. The odor of the acid can always be detected in the breath. The patient soon becomes unconscious and sinks into a state of collapse, with snoring breathing, purple face, contracted pupils and cold skin. In fatal cases death usually occurs in from two to eight hours.

Treatment.—Emetics should first be given, then Epsom salts in large quantities (from one-half ounce to one ounce hourly). Oil will counteract the corrosive effect. If there is none at hand, melted butter or lard may be used. Treat the collapsed condition by stimulants and the application of heat to the spine. Atropine in one one-hundredth of a grain doses is an antidote.

ZINC.

The chloride of zinc is the most common form.

Symptoms.—Burning in the throat and stomach, with vomiting and purging, followed by convulsions and coma.

As treatment give soda, milk, eggs, or tannic acid in twenty grain doses every two hours.

IODINE.

Most cases of iodine poisoning come from taking the tincture through mistake.

Symptoms.—Burning pain in the throat and stomach, with vomiting and purging.

Treatment.—Give an emetic, then follow it with starch in any form. It may be necessary to give opiates to relieve pain.

POISON IVY.

(Poison Oak.)

This is an exceedingly poisonous vine, climbing by rootlets over rocks, fences, trees, etc., having compound palmate leaves, each consisting of three leaflets, and bearing clusters of small, dark berries. Some persons can handle it without being injured, while others are poisoned by coming into its vicinity without even touching it.

Symptoms.—Swelling and redness of the skin, accompanied by intense itching and burning, and in many cases by the formation of small watery blisters.

Treatment.—If the parts affected by the plant be immediately washed with ordinary alcohol there will be no further symptoms. If this has not been done in time, and swelling and eruption or blisters have appeared, the parts should be washed in a solution of subacetate of lead, as often as may be necessary to give relief. If the pain is great use the following:

Solution of subacetate of lead, two parts.

Tincture of opium, one part.

Water, one part.

One teaspoonful of the fluid extract of *grindelia robusta* in four tablespoonfuls of water applied to the parts is an excellent remedy.

The poison is an acid and the object of the treatment is to neutralize it by alkaline washes.

If the above remedies are not accessible, apply strong solution of common baking soda, ammonia water, lime water, weak lye, or soft soap.

POISON SUMAC.

This is a shrub from six to eighteen feet high, grows in swamps and, in the Northern States, flowers in June. Its bark is smooth and its leaves compound, with from seven to thirteen leaflets. It is often called, incorrectly, Poison Elder and Poison Dogwood.

The symptoms and treatment are the same as in poisoning from ivy.

MUSHROOMS.

The poisonous varieties of the mushrooms are usually colored red and yellow, but no certain rules for detecting them can be given. Varieties harmless to some may be poisonous to others, though not fatally so. Tyson says: "Avoid highly colored fungi with astringent taste and pungent odor."

Symptoms of Mushroom Poisoning.—Excitement with violent colicky pains, vomiting and diarrhea. The skin is cold and the pulse slow, showing a failing heart.

Treatment.—Give emetics and after their action give physics. Stimulate by applying heat externally and by giving spirits internally, as whisky or brandy.

Atropine is the physiological antidote, but it should only be given by a physician.

PTOMAINS.

Ptomains are poisons resulting from the decay of animal or vegetable matter. Recent studies show that they are formed by microbes, otherwise known as bacteria, bacilli, etc. The principal ptomain poisons are those of meat, milk and fish.

1. Meat poisoning follows the eating of meat that has undergone decomposition, and may result from ham, beef, mutton, sausage, poultry or canned meats.

2. Milk and its products. There is a ptomain peculiar to milk, cream, cheese, and various other eatables, composed principally of milk. It is called tyrotoxinon.

3. Fish that have decomposed contain ptomains.

4. Mussels frequently contain ptomains. Whether they are peculiar to a certain variety of mussels, or are common to all

varieties, is uncertain, but it is known that mussels found in stagnant water are most frequently poisonous. Mussels may be poisonous to some persons and not to others.

The symptoms in all kinds of ptomain poisoning do not greatly vary—being the symptoms of violent inflammation of the stomach and intestines.

In fatal cases death does not generally take place in less than forty-eight hours.

Symptoms.—Nausea, vomiting, cramps and diarrhea or constipation.

There is dryness of the throat, disturbance of vision and great prostration.

Treatment.—Ptomain poisoning is more like a disease than most other forms of poisonings, and cannot be well treated except by a physician. Usually there is sufficient vomiting and purging to expel from the body the poison not absorbed. If not, emetics should be given and followed later with physics. Stimulants are necessary, such as heat and spirits, or strychnia in one-fortieth grain doses once in two hours. Opiates may be given to allay the pain.

TURPENTINE.

Although not a real poison, turpentine may cause serious harm, and even death, if taken in sufficient quantities. It has been used for producing abortions, for which it is an insufficient and very dangerous agent, and it is frequently taken for coughs and colds. The medicinal dose is from five to thirty drops, and more than that should never be taken.

OBJECTS SWALLOWED.

Stones, coins, buttons and various other small objects are frequently swallowed by children, to the great alarm of their parents. These accidents seldom do any harm. A full meal of mashed potatoes is an excellent antidote. The object will be enclosed in a ball of the soft potato and do no harm until expelled from the body.

Sometimes by quickly grasping the child by the heels, holding him head downward and rapping him briskly on the back with the palm of the hand, the object will fly out of his mouth.

CHAPTER III.

DROWNING.

Respiration is absolutely necessary to life. When God breathed into man the breath of life, man became a living soul, and when the breathing stops his body soon becomes a clod. Death from lack of air, or oxygen, which is the essential element, is scientifically known as asphyxia. In drowning, asphyxia is caused by water entering the lungs, or otherwise cutting off the entrance of air.

The time that persons may remain under water without losing their lives varies greatly. The latest and best authorities state that, in the great majority of cases, death takes place within two minutes, and that after five minutes recovery is very doubtful, but there appear to be well authenticated cases in which persons were restored after having been under water for half an hour. A person in a fainting or cataleptic state will survive much longer than one who continues to fight until suffocation takes place, since the latter, in his struggles for breath, draws water into the lungs, while the former stops breathing immediately, and, by closure of the glottis, water is prevented from entering the lungs.

Efforts should always be made to revive a person, even though he has been under water an hour or two, unless it is plain that the heart has stopped. As long as there is the slightest flutter in the region of the heart, all efforts should be made persistently and continued for hours, if need be; but when it is certain that the heart has stopped, further attempts are useless. Other functions of the body may cease and begin again, but when the heart stops it stops forever.

Three things should be considered in treating a case of drowning:

1. *Get the water out of the lungs*, that the breathing may be restored. To do this, place the patient on his face with his head and shoulders lower than his hips. A roll of clothing or blankets, a log, barrel, or any similar device, may be placed under the abdomen, and the mouth should be kept open by tying a handkerchief



through it like a gag, then press firmly upon the spine below and between the shoulders. The water will run out and very soon empty the lungs. Should none of these things be at hand, lose no time in looking for them, but immediately step astride the body as it lies face downward, and, clasping your hands below the abdomen, lift the middle of the body as high as possible and hold it there, the face still resting on the ground, until the water has run out of the lungs. Many prefer this to the first method.

2. *Restore the breathing by artificial respiration.* There are many ways of doing this, of which the following, known as "the Satterthwaite Method," is perhaps the best: As soon as the water has been gotten out the lungs, turn the patient on his back, keep his mouth open (by a gag, if necessary), and draw out the tongue, press gently, but firmly and slowly upon the abdomen, then suddenly remove the pressure. The direction of the pressure should be backward (toward the spine) and upward (toward the lungs). Repeat these movements five or six times a minute, and, later, ten or fifteen times a minute, but do not become excited and make them more rapid than that, and do not pound or slap the patient.

The Sylvester Method is probably more widely known than any other, and is as follows: With the patient lying on his back place a roll of clothing under his shoulders to raise them three to five inches, the back of the head still resting on the ground, and, kneeling back of his head and grasping his forearms just below the elbows, press them very firmly, but gently upon his abdomen, as shown in Fig. 1, then slowly raise them to the position shown in Fig. 2, keeping the elbows well apart and higher than the shoulders, and continue the movement until the arms are brought above the head as shown in Fig. 3. Hold them there five seconds, then return to the first position and press again upon the abdomen so firmly as to drive the air out of the lungs. Repeat this series of movements five or six times per minute, later increase them to fifteen times per minute and thus continue until the natural breathing is restored, or all possible chance of recovery has passed. When there are assistants, the two methods may be carried on simultaneously, one person pressing the abdomen at the same time that the other operator presses down upon it with the arms, and removing the pressure when the arms are raised.

Other assistants should meantime remove the wet cloth-

ing, ripping or cutting it off, if necessary, to get it away quickly, especially remove all constriction from the waist and chest, and wrap the patient in warm, dry clothing, overcoats, blankets, or any such thing obtainable; then rub the body under the clothing, particularly upon the extremities, making the frictional movements toward the heart to restore the circulation. Apply ammonia to the nostrils, and heat, as hot stones, bricks, cloths, or hot water bottles, if it is possible to get them, to the extremities. Artificial respiration should be continued for hours, if there is the slightest hope of success. In drowning, and in many cases of poisoning, it is of more value than electricity, or any other known restorative measure.

3. *Stimulants*.—When the pulse returns to the wrist, warm drinks, beef tea, or alcoholics, if very carefully administered, may be given.

SUFFOCATION.

Suffocation from smoke, poisonous gases, loads of earth, hanging, or any other cause, should be treated by artificial respiration, and in every other way, as outlined for drowning, except that in these cases dashing cold water in the face often aids in restoring to consciousness.

FROST BITES.

The principal object in treating frost bites is to bring about a gradual restoration of sensation, circulation and heat to the injured part. If the temperature be raised suddenly great pain will, and permanent injury may, follow; while if the temperature be raised very slowly, complete recovery will often take place, although the extremity or part of a limb is completely frozen. When restoration does not occur gangrene follows, which, in case of a limb, necessitates amputation. Freezing is accompanied by a sense of numbness, and is shown by the white, blanched appearance of the part.

Treatment.—First rub with snow, or put the part in ice water, and use gentle friction, the patient always being kept in a cold room, and never placed in a warm bed. Gradually raise the room temperature, also that of the water bath. After the natural temperature of the body returns, warm drinks and stimulants may be given. Cases of gangrene must be treated by the surgeon. In

case of apparent death from cold, the treatment should be used, together with artificial respiration and heart stimulants, such as strong coffee, whisky or brandy, or strychnia—one-fortieth of a grain every two hours. There are cases on record in which recovery occurred after unconsciousness and burial in the snow for several days.

SUNSTROKE, OR HEATSTROKE.

Sunstroke is a very high fever, resulting from exposure to the heat of the sun. The same condition may result from exposure to a high temperature artificially produced, as in laundries, the fire-rooms of steamships, etc. Sunstroke is rare in a dry atmosphere, but frequent in a moist one, even at twenty degrees lower temperature. Persons who drink alcoholic liquors to excess are more liable to this danger than the temperate. After recovery from a "sunstroke" mental injury may remain, and very frequently those who have once suffered from it cannot afterward endure even a moderate degree of heat without headache and nervous excitement. Sunstroke may be followed by meningitis or, more rarely, by epilepsy.

Symptoms.—There is first a sense of burning, heat and oppression, which may be accompanied by dizziness, headache, vomiting and sometimes diarrhea. Unconsciousness then comes, with restlessness and delirium.

The face is flushed, the eyes bloodshot, the skin hot and dry, the breathing labored and the temperature very high (107 degrees to 112 degrees Fahrenheit). There may be slight convulsive movements; the unconsciousness becomes a stupor, and the stupor a coma. The pulse grows rapid and the breathing irregular.

If consciousness returns and the temperature begins to fall, recovery may be expected. A temperature above 110 degrees indicates that recovery is improbable. Death occurs after several hours.

Treatment.—There is but one immediate object in the treatment—to lower the temperature; and that as speedily as possible. This is best done by stripping the patient and placing him in a cold bath; the colder the better. If ice can be had it should be added to the water, and the skin rubbed with pieces of ice. Ice water injections into the rectum are also useful. If bathing facilities are not at hand the patient should be stripped and placed on a piece

of oil cloth and cold water be poured over him. A horse trough and pump will answer the same purpose. Do not fear his taking cold, but use every means at hand. Of course, the temperature should be watched and when it begins to go down the heroic treatment should be gradually lessened until the body reaches something like its natural temperature (98.6 degrees).

BURNS AND SCALDS.

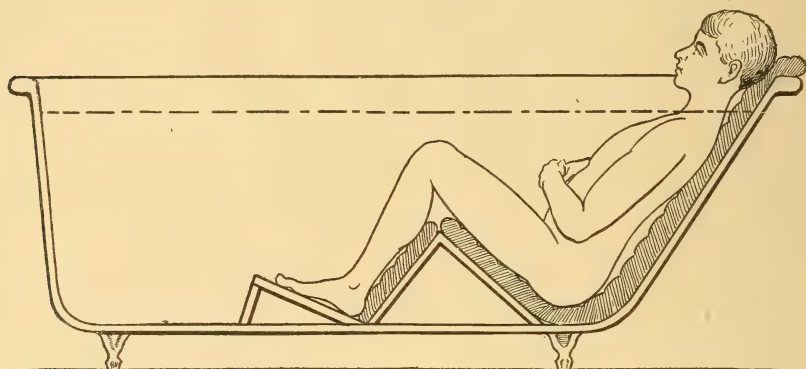
Burns and scalds do not differ in their effects. In fact, a scald is only a burn made by a fluid substance. A burn may be produced by a variety of substances; such as heated metals, hot water or steam, lightning or electricity, acids, alkalis, molten metal, etc. Practically, the symptoms and treatment are the same, but there is a difference in the degree of severity of burns that is highly important. Physicians very logically divide burns into three classes, according to the degree of injury.

Burns of the First Degree.—A burn of the first degree produces only a redness of the skin, with slight inflammation and some pain. It leaves no after effects, and should be treated by the application of common dry baking soda and a wet cloth, or by smearing over with carbolized vaseline.

Burns of the Second Degree.—A burn of the second degree is more severe and produces a blister. The blister should be punctured, then treated as above. Other applications are lard, olive oil and flour, any of which should be covered with a damp cloth. An old remedy is carron oil, composed of equal parts of olive oil and lime-water, but it is one of the poorest of all remedies. An excellent application, and one that is always at hand, is ordinary baking soda. It should be dusted on plentifully until the wound is well covered, then bind a wet cloth over all. The soda relieves pain, keeps the wound clean, and promotes healing. Opiates or chloral should be given if necessary. Bits of ice will relieve thirst.

A saturated solution of picric acid is a comparatively new remedy for burns, and is probably the very best. Spread a thin layer of cotton, wet in the solution, over the burn. It gives instant relief, and should be renewed from time to time to keep the skin constantly wet. A burn upon a patient in good health will heal very rapidly under this treatment. The acid is poisonous, but is soluble in water to the extent of only one-half of one per cent, hence, unless spread upon very large surfaces, there is no danger from absorption.

It was formerly thought that a burn of the second degree, or even of the first, affecting one-third of the surface of the body, must prove fatal, but patients now are often saved, after having been burned very much worse, by simply keeping their wounds away from the air by constant immersion in water until the new skin forms. For this purpose a bath tub should be quickly prepared by making a triangular support of clean boards for the legs, also supports for the head and back, as shown in the illustration.



Immersion for Severe Burns.

A soft blanket, folded in several thicknesses, is then spread over all, the patient placed thereon, and water, at 94 degrees Fahrenheit, turned in until it rises to his neck, after which a small stream, warm enough to maintain the temperature as nearly as possible at 94 degrees, must be kept running into the tub, and an overflow of the same size provided for, that by continual, gradual change the water shall be kept pure. A watchful attendant must remain constantly with the patient until the recovery is made. Patients have been kept thus under water for weeks, even months, and finally saved, although at first their cases seemed hopeless. Unless thus treated, if one third of the body surface is burned, death follows within forty-eight hours. It is fortunate that in very severe burns the patient is spared great suffering by dying during the unconscious period of shock.

Burns of the Third Degree are still more severe, and are those by which some part of the body is burned to a black char and destroyed. They are often fatal, but if not, they always leave a disfiguring scar, and should be treated by a surgeon, if possible. They may be fatal in a variety of ways, as from immediate nervous

shock, congestion of the brain, erysipelas, or inflammation of any of the internal organs.

The objects of the treatment should be twofold:

1. *To Relieve Pain.*—The directions for doing this we have already given. An important factor in most applications for relieving pain is the exclusion of air from the burned surface, which should be covered with a silk or rubber protector, then with cotton and loose bandages. The dressings should be changed every three or four days.

2. *To Relieve Shock.*—Treat the shock by rest and warmth and, after consciousness returns, give stimulants, such as hot coffee, milk punch or beef tea.

A large burned surface that does not heal readily should not be allowed to heal by granulation, but should be covered by skin grafts to avoid the contraction of the scar which, without this precaution, will always cause great deformity, and is liable to be so serious as to destroy the use of the limb. Poultices are not used by the modern surgeon. They are apt to cause suppuration, just what should be avoided. Everything in the dressing of wounds should be done with reference to preventing suppuration.

Inhalation of hot air is one of the deadliest of all the dangers incident to fires, but one which by a little intelligence, calmness and self-control can usually be overcome. If caught, so that the only escape lies through the fire, quickly tie a handkerchief, stocking or other article of clothing over the mouth and nose, or if there be no chance for this, having filled the lungs with air, clasp the nose and mouth in the hand, and, remembering, no matter how great the pain, that life depends upon holding the breath, dash through the flames to safety. As cotton ignites far more readily than wool, draw on woolen clothing if possible before exposure to the flames.

LIGHTNING OR ELECTRIC SHOCK.

The injuries produced by electricity are nervous shock, burning and paralysis. These shocks should be treated the same as any other shock—by applications of heat to the spine, strong coffee and other stimulants.

The burn should be treated just as any other burn. The paralysis should be treated by an intelligent physician; and when so treated usually disappears.

BITES AND STINGS OF INSECTS.

Leptus (Harvest Mite).—This pest is a minute red mite, which buries itself in the skin. It attacks all parts, but more often the ankles, causing pimples which are very itchy or burning.

Treatment.—Bathe the part with a dilute wash of carbolic acid.

Bees, Wasps and Hornets.—The bites and stings of many insects, as the mosquito, bee, wasp and hornet, may not only be severe and very painful, but death has sometimes occurred, either from the shock to the nervous system or from absorption of the virus. Children suffer more from them than do adults, because of the more impressible nervous system in youth.

Treatment.—Soda and ammonia are common household remedies, but they afford little relief. Water containing all the sugar of lead it will dissolve is an excellent remedy and is best applied with absorbent cotton. Wet salt or mud may be used. Ichthyol is a newly discovered drug, which relieves the pain and swelling of a sting almost instantly. It should be spread on pure with a brush, in which case it will act surely and promptly.

Spiders are also able to inflict severe injury by the injection of poison. In warm countries the tarantula is well known from the severity of its bite. Some species of ants and caterpillars also attack the human skin and produce burning, stinging pain, with more or less swelling. Treat all these bites with sugar of lead or ichthyol, as recommended for bee stings. It is a wise precaution to lance a tarantula bite and cause free bleeding as soon as possible. If no other remedies can be quickly obtained cover the part with mud, first sucking the wound vigorously and spitting out the poison. One with sore lips, sore mouth or decayed teeth should never attempt this for another person, lest he absorb the poison into his own system.

BITES OF SERPENTS.

Many people firmly believe that the bite of any and every snake is poisonous and dangerous. This idea is erroneous. According to the best authorities, there are only three poisonous snakes in North America; and in a great many cases a bite by one of these does not prove fatal. The venomous snakes of this country are: The Rattlesnake (*crotalus horridus*), the Copperhead (*tri-*

gonocephalus), and the Moccasin. In Europe the only dangerous snake is the viper. In India and South America there are many others.

The poison apparatus is similar in all. It consists of a sac containing the venom, situated below the eye and near the root of the fang; the fangs, two in number, in the upper jaw, and a tube leading from the sac through each fang to its point. Pressure on the fang produces pressure on its sac, forcing the venom out through the tube. This venom, or poison, seems to be almost indestructible. Nothing affects it; neither heat nor cold; acids nor alkalies; time, nor decomposition. Yet it is perfectly harmless when taken into the healthy stomach. It acts upon children more seriously than upon adults.

Symptoms.—The part bitten immediately swells and becomes painful; dark, red spots appear and the swelling spreads; giddiness comes on with dizziness and dimness of vision; clammy sweat and great terror. Later there may be nausea and vomiting; the pulse grows fast and feeble and the breathing labored. Death may occur quickly, but usually not until from five to forty-eight hours. If the case does not yield to antidotes, blood poisoning, which is always a serious affair, comes on. The part is then greatly swollen, and the skin becomes puffy and mottled; often giving rise to the idea that the person is turning to the color of the snake. This condition demands the services of a competent physician at once.

Treatment.—The wound should be sucked or cupped, but always bear in mind that the person who sucks any poisonous wound must have a perfectly healthy mouth and sound teeth. If it be an extremity that is bitten, a moderately tight bandage above the bite will to some extent prevent the spread of the poison; but this bandage must not be left on too long. The principal antidote is a stimulant of some kind. Ammonia is very good, but as whisky is efficient, and usually at hand, it will probably continue to be used more than all other remedies. In its use, but one caution is necessary; do not give it to the point of intoxication. When so given it adds to the effects of the poison, instead of combating it. Give the whisky slowly until it produces a slight exhilaration, then stop. When this effect begins to pass off give a little more and thus continue and it will prove safe and effective.

HYDROPHOBIA.

Hydrophobia, or rabies, is an infectious disease of animals, which is sometimes communicated to man. The dog is the most frequent subject of the disease, but it is sometimes also seen in the horse, mule, cow, wolf, skunk, rat, cat, pig and rabbit. Its cause is a virus, most probably a germ, contained in the saliva of the afflicted animal and from it communicated to others and to man. The time from the infection until the appearance of the disease is usually about six weeks, but may be as short as one week, or as long as several months. If the disease does not appear in less than eight months it will, in all probability, never appear.

Not all of those bitten by rabid animals become infected. One eminent authority says only fifteen per cent, but the greater number say that about two-thirds of those bitten take the disease. Of course, there are many who think they have been bitten by mad dogs, when, in fact, the dogs were not rabid. Children are more susceptible than grown people, and bites in the face are much more dangerous than those upon other parts of the body. The next most serious location is the hand. When the disease has appeared, all treatment and all hope are vain. Dr. Nicholas Senn says: "In man this terrible disease is invariably fatal. There is not an authentic instance of recovery from genuine hydrophobia."

Symptoms of Hydrophobia in Dogs.—Hydrophobia means "fear of water," and in man a dread of water is the most prominent feature of the disease; but dogs drink with eagerness and manifest no such fear. This is contrary to the general opinion, but, nevertheless, true. At first the dog becomes dull and morose, mopes and avoids his master and companions; then restless, and runs about barking and snapping at imaginary objects. During this time there is rarely a tendency to bite, or to fits of uncontrollable fury. In this stage the danger is from licking rather than from biting.

After a time comes a fit of maniacal fury, generally provoked by the sight of another dog. When this subsides he becomes controllable again, but is disposed to wander from place to place. With a slinking appearance, head and tail down, eyes bloodshot, and with foam at his mouth, he trots along snapping and biting at imaginary objects. He is aggressive only when attacked, but his fury is then unbounded. He drinks water eagerly and will try to drink when swallowing becomes difficult or impossible. He

seems entirely insensible to pain, dashes himself against his kennel, and has been known to seize and hold a red hot poker in his mouth. When tired out from hunger and wandering he drops exhausted in some out of the way corner, to start again after a short rest, and finally dies from exhaustion. The average duration of the disease in the dog is five days; it never exceeds ten, after the first symptoms appear.

Symptoms of Hydrophobia in Man.—The first symptoms appear in the wound itself. It becomes red and tender, with sensations of uneasiness, itching, or even of pain. The patient becomes irritable and melancholic, and his sleep is disturbed. The first definite symptom is a sense of tightness and choking in the throat, with slowness in swallowing, especially in swallowing liquids. There is inflammation and great dryness of the throat. On attempting to swallow, the patient becomes agitated, hesitates, then drinks a very small quantity, or none at all. "The difficulty in swallowing rapidly increases and the act soon becomes impossible. Next, the breathing becomes difficult and painful, with a sense of want of air, or of impending suffocation. Indeed, the most marked symptoms are spasms of the muscles of the throat and neck, by which swallowing is prevented and breathing interfered with." The voice becomes dry, hoarse and spasmodic—often giving rise to reports that the patient growls like a dog. Shuddering tremors run through the whole body, and a fearful expression of anxiety, terror and despair is depicted in the countenance. Frothing at the mouth is rare, but mucus collects in the throat, occasioning hawking and spitting.

The pulse becomes feeble and rapid, and the temperature goes up to 102 degrees or 103 degrees. The mental faculties are but little impaired. "To a bystander, the most distressing feature of the case is the fear of impending death, which is usually manifest after the first attack, and remains throughout the whole course of the disease." The distinction between hydrophobia and lock-jaw is one that is not always easy to make. Death occurs from complete exhaustion, its immediate cause being lack of air from spasm in the throat.

Treatment.—There are various methods of treating hydrophobia, most of which are wrong. Before detailing the proper treatment, it seems necessary to mention one very improper treatment; namely, the application of the so-called mad-stone. The

subject of mad-stones is never mentioned in works written for physicians, for such a mention would be an insult to their intelligence. But it may be that there are yet in America persons so benighted as to believe in the efficacy of the mad-stone, although it is only a relic of barbarism—of the time when our ancestors lived in caves, wore the skins of wild animals and worshiped idols. It is on a par with the fetich of the cannibal, the voodoo of the African, and the rabbit's foot of the American negro; and belongs to the same category as wearing a rattlesnake's skin next the body for rheumatism, blowing a silk handkerchief through chest wounds, and putting camphor in the baby's coffin to dry up the mother's milk.

The so-called mad-stone is either a porous stone of volcanic origin, or an accretion stone; such as is sometimes found in the stomach of ruminating animals. In either case it is porous like a sponge, and is usually prepared for use by boiling in milk, though boiling in water or heating in an oven would serve the purpose quite as well—which is to drive the air out of the pores of the stone by the action of heat. It is then clapped on the wound and the vacuum, produced in the pores of the stone by cooling, causes it to cling to the raw surface and absorb blood and the juices of the flesh until the vacuum is overcome and the stone drops off. It is thus seen that the mad-stone does possess some slight absorptive power, and, if immediately applied to the wound, might possibly absorb some of the virus, though cupping or a moist sponge, tightly squeezed just before its application, would be better, and suction by the mouth would be very much better; but when several hours have passed before the stone is used, it can be of no possible value. The poison has then entered the blood and been carried to all parts of the body, and to attempt to draw it from the wound is as useless as to try with a sponge to sop up milk that was spilled on soft ground yesterday.

Someone says that if it does no good it can do no harm. But it does do harm; and in this way: It gives the patient a false sense of security and prevents him from employing intelligent and efficient methods of treatment, until forever too late. To use it is to forsake common intelligence, and lose precious hours in foolish voodooism, thus giving the poison time to spread through the system, and get such a hold that even scientific treatment will be powerless to overcome it. It is certainly time

that such ignorant and childish beliefs should be abandoned, and hydrophobia treated with the same degree of intelligence that we employ in treating small-pox, malaria, diphtheria and other diseases.

In case of a rabid dog bite there is but one course to pursue. The wound should be sucked as soon as possible, by one without any badly decayed teeth, or any sores in his mouth or on his lips, then immediately cauterized. The cauterizing may be done by a poker, nail or any other small iron heated to redness. It may also be done with caustic soda, caustic potash, nitrate of silver, or nitric acid, but actual cautery with the hot iron is better and less painful, and can be placed in the exact spot better. The iron should be thoroughly applied and carried well down to the bottom of every part of the wound, but care must be taken not to needlessly burn a larger surface than was injured by the bite, and to then quickly cover the wound with absorbent cotton or some other antiseptic dressing to keep out pus producers, and other germs, lest by making a sore that shall become covered with scabs, the spread of any remaining virus be promoted instead of prevented.

The very best remedy that can next be used is fresh lemon juice, two or three times a day. Wipe a lemon clean and cut a hole in it with a clean knife; then, without touching the wound, squeeze the lemon over it, dropping the juice into it until the wound is saturated. Then replace the antiseptic dressing. Meanwhile, the patient must lose no time, but as soon as possible reach an institution where he can receive the Pasteur treatment. There is nothing more certain in the whole range of medicine than that this treatment will, if taken soon enough, prevent hydrophobia.

As already stated, there is no record of a single case of hydrophobia that ever recovered under any treatment, and as two-thirds of all those bitten take the disease, we may say that the death rate with all treatments besides the Pasteur is about 67 per cent. The records of the original Pasteur Institute in Paris show that by its method the death rate was reduced to a small fraction of 1 per cent. The treatment is so complex and requires such great skill and care that it can be administered only in an institution specially prepared for it. There are Pasteur institutes in all the great cities of Europe, and one in New York, one in Baltimore and one in Chicago. Although care is used to receive no patients except those bitten by animals known to be rabid,

or strongly suspected of being so, the treatment has failed to prevent hydrophobia in only about one-third of 1 per cent of the many hundreds treated at the Pasteur Institute in Chicago and, doubtless, these would also have been saved had they arrived in time.

Unless the animal inflicting the bite is positively known to be rabid, it should not be killed, but carefully confined where it can do no harm. If it does not die within fifteen days it is certain that it was not rabid at the time of the biting. The popular idea that if a dog goes mad at any time longer than fifteen days after biting someone, he was probably mad at the time of the biting, is wholly wrong. No dog lives longer than ten days after showing the first signs of rabies. Pasteur proved that a dog carries the poison in his mouth seven days before showing any signs of the disease, a fact that has since been verified by other investigators. Never allow a dog to lick the hand if there be upon it any sore, scratch or abrasion of the skin.

Hydrophobia chiefly affects the nervous system, notably the spinal cord and brain. A healthy animal inoculated with virus taken from the spinal cord of one suffering with hydrophobia soon develops the disease, but if the affected spinal cord be removed from the body and slowly dried in an incubator kept at a uniform temperature of 70 degrees, its virus gradually loses its strength until in fifteen days it becomes so weak as to be able no longer to produce the disease. The Pasteur treatment consists of a series of inoculations, beginning with virus that has thus been dried fifteen days, and each time using virus that has been dried one day less and is therefore a little stronger than that used the preceding time, thus gradually bringing the system to a toleration of the poison, until it is rendered immune, i. e., incapable of being injured by direct injections of the strongest virus of hydrophobia. The time required in which to give the treatment is fifteen, eighteen or twenty-one days, according to the severity of the case, and the sooner after the bite it is given the better the chances for the patient. To this phenomenon, of the system gradually accommodating itself to a poison, and the wonderful fact that the virus works more slowly when communicated through the saliva of the animal inflicting the bite than when taken from its nervous tissues and injected into the subdermic tissues of the patient, any person may sometime owe his deliverance from a dreadful death.

BACTERIA.

By L. C. DUNCAN, M.D.

In 1675 Leeuwenhoek, a Hollander, by the aid of single lenses, first saw the minute forms of life which we call bacteria. He found them in saliva. A little later, the compound microscope having been perfected, putrid liquids were shown to swarm with organisms so minute that millions were held in a single drop, but it is not known if he associated these germs with the causation of disease. It is thought, however, that the man who first conceived the cause of disease to be a living contagion was the Roman Varro, who lived in the time of Cæsar. In one of his books he says: "If there be any marshy places, certain minute animals breed there which are invisible to the naked eye, and yet, getting into the system, cause diseases difficult to treat." He evidently had in mind malaria, which we now know is caused by just such "minute animals." It was almost 2,000 years before the idea was again taken up, and Henle, in 1821, proposed the germ theory of disease. Of course it aroused opposition, but every objection was met and overcome.

Latour and Schwann proved, in 1837, the active principle of yeast to be a minute vegetable form of life, since known as the yeast plant. In 1849 Pollander discovered the germ of anthrax (the splenic fever of animals), and in 1863 Davaine proved by inoculative experiments that this bacillus produces the disease. In 1862 Pasteur showed that many forms of life float about in the air, and in 1872 Klebs taught that blood poisoning is caused by bacteria. The next year Obermeier discovered the germ of relapsing fever, and by 1875 the germ theory had secured general recognition. It was in that year that Lister proposed the use of substances that would either prevent the growth of the bacteria of disease or destroy them. The former substances are now known as antiseptics, the latter as disinfectants. He began with the use of solutions of carbolic acid in his surgical operations and immediately revolutionized surgery. This was the first, and it still remains the greatest practical application of the germ theory of disease.

In 1879 Hanson discovered the bacillus of leprosy and Neiser the micrococcus of gonorrhea. In 1880 Eberth and Koch discovered the bacillus of typhoid fever, Pasteur the bacillus of chicken cholera and Sternberg the bacillus of pneumonia. In 1882 Koch made the greatest discovery of them all, by finding the germ which causes consumption, scrofula, joint disease, Potts' disease, lupus and all the other forms of tuberculosis—a disease which destroys one-seventh of the human race.

In 1884 Koch discovered the spirillum of cholera. Löffler the bacillus of diphtheria, and Nicolaier the bacillus of tetanus. In 1892 Pfeiffer found the bacillus of influenza or la grippe. In 1894 Yersin discovered the germ of the Eastern bubonic plague, and in 1897 Sanarelli reported the discovery of the bacillus of yellow fever, but it has never been made to comply with all the tests required in such investigations. Cancer and syphilis are two other diseases evidently of bacterial origin, but though sought long and carefully, their germs have not yet been found.

GERM CAUSATION OF DISEASE.

That there should be no doubt that a certain germ causes a certain disease, Henle and Koch laid down four laws:

1. The germ must always be found associated with the disease.
2. It must be found in the living body.
3. It must be obtained from the body and grown on culture media, uncontaminated with other germs.
4. These separated germs, when injected into another person in sufficient quantities, must produce the disease.

Unless the germ fulfills all of these four conditions it cannot be said to be the cause of the disease.

The germ causation of infectious diseases is now universally believed by scientific men, and, since the germs of most diseases have been found, efforts at present are not so much in the line of discovering new germs as in new applications of our present knowledge. If the germs which cause disease are living bodies, we have only to destroy them to prevent or stop disease. The question is, how to destroy them, or at least how to stop their action. It has been found that a number of chemicals, such as bichloride of mercury, carbolic acid and alcohol, will do this. In surgery these antiseptics applied to a wound destroy

the germs there, and in this way suppuration, blood poisoning, hospital gangrene, erysipelas, tetanus and other complications may be prevented. With these dangers removed the surgeon dares to enter the abdomen, stomach, lungs, brain and other parts of the body, heretofore sacred ground; in fact there is scarcely any part of the human anatomy that the surgeon of to-day fears to touch with his knife.

In medicine, progress has not been as gratifying, for although several diseases have been conquered many yet remain. Obviously, in the case of a general disease, strong chemicals cannot be introduced into the body in sufficient quantities to destroy the germs without also destroying the life of the patient. Hence investigators have sought a cure in the bacillus itself, or in its products. Since a person who has once had a certain disease, as yellow fever, does not usually have it again, it is thought that the disease must leave some substance in the blood which renders it an unsuitable habitation for that particular germ. The difficulty is to find and secure that substance, toxine or antitoxine, whatever it may be.

Behring and Roux were the first to succeed in this field. By inoculating a horse with diphtheria they prepared an antitoxine from its blood which, on being injected into the arm of a healthy child, will prevent diphtheria from one to two months, and, if injected early enough, will cure most cases of the disease. (See Diphtheria.) In the same way an antitoxine for tetanus has been prepared, though not yet an unqualified success, and the Pasteur treatment for hydrophobia is somewhat on the same general plan. (See Hydrophobia.)

A most valuable addition to our knowledge of diseases is promised in the treatment of cancers and other tumors by the toxine of erysipelas. Since it has been found that some germs prey upon others, or, more properly, the toxine produced by one variety is fatal to those of some other varieties, the happy idea has taken shape that the germs of a mild disease may be set upon those of a fatal disease and made to destroy them. Dr. Coley of New York has cured a number of cases of cancer by inoculating the patient with the toxins of diphtheria; but others have tried the plan with little success, and it is still in the experimental stage.

The only diseases that have thus far been successfully prevented

or treated are small-pox, diphtheria and hydrophobia; but, knowing the cause, we know how to stamp out all infectious diseases; all we lack is the power. Had we authority to handle every case of typhoid in accordance with our best knowledge, we could prevent in each case the escape of any typhoid germs to produce other cases, and in a comparatively short time typhoid fever would be banished from the earth. So with scarlet fever, yellow fever, tuberculosis, and all other infectious diseases. Since we have not the power of banishing them we must seek means of curing them. The child does not fear until it is hurt; the adult fears first and avoids the hurt. Society, apparently, is still in the child-like stage, but the time is coming when disease and crime will be prevented, instead of being permitted to develop and harass and destroy their victims.

Even doctors are often heard to speak of germs of disease as "bugs," thus conveying the impression that they are animals. This idea is false, for with few exceptions they are minute vegetable forms of life, the only exception of importance being the germ of malarial fever, which belongs to the group of protozoa—the lowest form of animal life.

Definitions.—In common use the terms germs, bacteria and microbes are used interchangeably, but there are many other names given them, descriptive of some particular characteristic, for germs are classified according to their form, etc., thus: (1) Micrococci, usually called cocci, are those germs which are ovoid like an egg or round like a marble; (2) Bacilli, those rod-shaped, like a pencil; (3) Spirilla, the varieties shaped like a spiral or corkscrew.

Again there are modifications of these classes, according to the mode of grouping, thus: Diplococci always occur in pairs, tetrads in fours, staphylococci in clusters like grapes, streptococci in chains, sarcina in cubes. A bacillus may be straight or curved; square or rounded at the ends, or enlarged at one or both ends. Most disease germs are bacilli.

Size.—Bacteria are so minute that they can be seen only with the highest power of the microscope. Figures convey little idea of their size. The tubercle bacillus, larger than many, is $\frac{1}{12}$ of an inch long and $\frac{1}{50}$ of an inch thick. Of the average bacilli it is estimated that 6,000 billions would be required to weigh a grain. Bacteria are also of such trans-

parency that it is exceedingly difficult to study them until stained. The discovery by Weigert in 1877 that these little bodies have such an affinity for the coloring matter of aniline dyes as to take a deeper stain than the substances or media in which they are found was a great step in their investigation, and it will be noticed that it is since that date that most of the varieties have been isolated, that is, studied separately and the peculiarities distinguishing each variety pointed out.

HOW BACTERIA GROW AND MULTIPLY.

Many varieties of bacteria reproduce their kind in two ways: By fission (division) and by spores. In reproduction by fission, around the parent germ a little pale line may be seen which grows deeper until the two portions are entirely separated, each thereby becoming a complete organism, which in turn by division, like the parent from which it came, also multiplies itself by two. As, by thus dividing once an hour, a single germ and its progeny may increase to over sixteen and a half millions in twenty-four hours, the rate of increase under favorable conditions is seen to be wonderful; the more so when it is remembered that they have been known to divide as often as once in twenty minutes. It does not often happen that all of the conditions are favorable to their most rapid development. Temperature is a most important factor. It must not be less than about 61 degrees or greater than 104 degrees Fahrenheit. Cold prevents the multiplication of bacteria but does not destroy them, and, while they may be rendered dormant by a low temperature for a long period of time, they awake to renewed activity and virulence as soon as the proper degree of heat is supplied. On the other hand, a sufficiently high temperature destroys all kinds of germs, the degree required for this purpose varying, according to Sternberg, from 129.2 degrees to 158 degrees Fahrenheit, in streaming steam; but boiling is the surest method.

Moisture is quite as important as favorable temperature to germ development, for its presence is absolutely necessary. When deprived of moisture, most vegetable germs, in drying, change their form, thicken their covering or skin, and become what are called spores, in which condition they may lie dormant indefinitely, unless moisture and warmth be supplied in the right proportions, when they again become germs, and, like their

ancestors, multiply rapidly. Sporification may also take place at other times, especially when the food supply becomes exhausted, or when, by means of the poisonous products formed by the germs themselves, it is changed into an unsuitable medium for their sustenance.

Spores are able to offer much greater resistance than bacteria to destructive influences; they withstand higher temperatures and the action of most poisons, and, as long as deprived of a combination of moisture and proper temperature, cannot germinate and are practically immortal. It requires boiling, often for twenty minutes, and sometimes longer, to destroy them. Careful experiments with spores taken from cavities in petrified wood, where they had lain no one knows how long, probably hundreds of years, resulted in their growing as perfectly as had they been but a few days old. Again most germs thrive best in the dark, and to many species bright sunlight is fatal.

THE UNIVERSAL PREVALENCE OF BACTERIAL GERMS.

Germs are everywhere, in the air we breathe, the soil we tread, the water we drink, the food we eat, the clothes we wear, and in the skins covering our bodies. Fortunately only a comparatively few species are injurious to man; some varieties are even thought to aid digestion by supplementing the action of the digestive juices; and many forms seem to live to prey upon other forms, the conflicts in the microscopic realm being quite as real as those waged in the visible world.

HOW BACTERIA PRODUCE DISEASE.

Most of the disease-producing bacteria do their deadly work not by directly attacking living tissues, but by producing ferments called toxins or ptomains, which by absorption are taken into the blood and thus enabled to spread their poisonous effects. One variety shows an affinity for certain parts, others for others, and their presence in each case is manifested by the symptoms of the disease thus produced. So often and so positively have certain well-known varieties been proven the causes of certain diseases, that the physician now depends largely upon them for his diagnosis, and, by so doing, is able to determine the exact nature of the ailment at an earlier stage of its development than would otherwise be possible. By placing a minute

portion of the diseased tissue, or of the secretions or excretions of the patient, in a preparation of gelatin, broth, seaweed, or other substance in which the suspected microbe is known to thrive, and supplying the conditions favorable to germ development, care having been taken to exclude germ life from all other sources, "a culture" is soon obtained, in many cases unmistakably revealing the character of the disease.

THE PUTREFACTIVE PROCESSES.

It is certain that the putrefactive processes are due to a few kinds of these bacteria which are widely disseminated and abound upon the objects all about us, and, as putrefaction hinders if it does not entirely prevent the healing process, it is most important in the dressing of all wounds that we understand the tiny foes with which we have to deal and the measures necessary to outwit or overcome them. Indeed, in healthy persons, when the proper precautions have been taken to exclude all kinds of germs, the most extensive cuts made by the surgeon very quickly heal without any sloughing or pus.

MINOR SURGERY.
OR FIRST AID TO THE INJURED.
By J. C. McCLINTOCK, A.M., M.D.

In the war with Spain the American soldiers were supplied with emergency or first aid packets before going to the front. They were put up by several firms and differed somewhat in their contents. Those furnished to the Illinois volunteers were devised by Senn, and consisted of about a teaspoonful of powder composed of one part of salicylic acid and four parts of boracic acid; one dram of absorbent cotton containing the powder in its center; a piece of sterilized gauze about forty inches square, and several safety pins; the whole wrapped in gutta percha.

Those put up by Johnson & Johnson, New Brunswick, N. J., contained two small gauze compresses, a roll of bandage, two safety pins and a triangular bandage on which were illustrations showing how to bandage every part of the body, all inclosed in oiled linen, and so prepared as to be absolutely free from germs of every kind. Each man was instructed to open his packet only in an emergency, but on receiving a wound to place one of the compresses upon it as soon as possible, to apply the antiseptic bandage over the compress, and to then use the triangular bandage as shown by the illustrations on the same. By following these directions, nearly every wounded man recovered, not, as many have supposed, because of the less serious wound made by the modern high power gun, but because the pus germs were thus shut out and the wound kept pure by the occlusional dressing until it could receive a permanent dressing at the hands of the surgeon.

Surgeon Newgarden, in speaking of the hospital work at Bloody Ford, Santiago, says: "Before the battle opened many of these packets had been thrown away by the thoughtless as being so much unnecessary encumbrance; but later, so high did they rise in the estimation of the men, I several times heard them trying to buy of one another, but without success. They evidently realized the value of the packet then. Small and almost

insignificant as it appeared before the fight, it really was one of the most important parts of the equipment, next to the actual munitions of war and commissary supplies. We owe directly to its prompt use the low mortality from wounds and the small number of amputations necessary. Many injuries which were not disturbed for some days after this first dressing was applied were found completely healed, and required no more care, when the dressing was removed, for the purpose of putting on a fresh one."

There could hardly be a clearer demonstration of the value of the discovery of the germ causation of suppuration and sloughing than is found by contrasting this scientific treatment with the murderous neglect inflicted upon brave heroes in all our former wars, when, left in many cases for two or three days upon the battlefield, their uncared-for wounds became terribly swollen and inflamed, if not horrid masses of suppuration and gangrene, before reaching the surgeon.

Packets, similar to those used in the army, are now put up by several manufacturers of antiseptic dressings and sold for about twenty-five cents each. They should be kept in every home. No family can afford to be without one. A box of antiseptic cotton, never to be opened until needed, and a bar of carbolic soap should also be on hand against emergencies. Any clean soap will do, but carbolic soap is the best of any that can be readily obtained and easily preserved.

PUS GERMS.

Of the few varieties of germs which are pus producers, each, on entering the blood or tissues, forms a product peculiar to itself. The most common is that called *staphylococcus aureus*. It produces a yellow or whitish yellow pus and is the chief factor in four-fifths of all cases of suppuration. Its germs are very widely distributed, being found almost everywhere, in the soil, on objects all about us, upon our clothing, our hands, and especially in the accretions under the nails, but not often in air that is free from dust.

The *staphylococcus albus* is the next most important variety, and produces a white pus. Although its germs occur everywhere, they most abound in the deep follicles of the skin, and are nearly always troublesome in surgical cases in which proper precau-

tions were not used prior to the operation. A thorough scrubbing of the skin at and around the places where cutting and stitching are to be done are the measures for avoiding them. The varieties which severally produce green, red and blue pus are less common and need only be mentioned here.

SURGICAL CLEANLINESS.

To the surgeon the words "clean" and "cleanliness" mean that which is "surgically clean"—free from foreign matter and all pus germs—a condition so important that first of all, unless there be such severe hemorrhage as to demand immediate attention, the hands of any person about to do up a wound should be made clean by thoroughly washing with clean soap and water. As the ordinary washbowl and soapdish, even when apparently clean, are generally very unclean, teeming with the very germs to be avoided, it is safer for this purpose to use almost any other basin or pan, it having first been carefully washed and scalded.

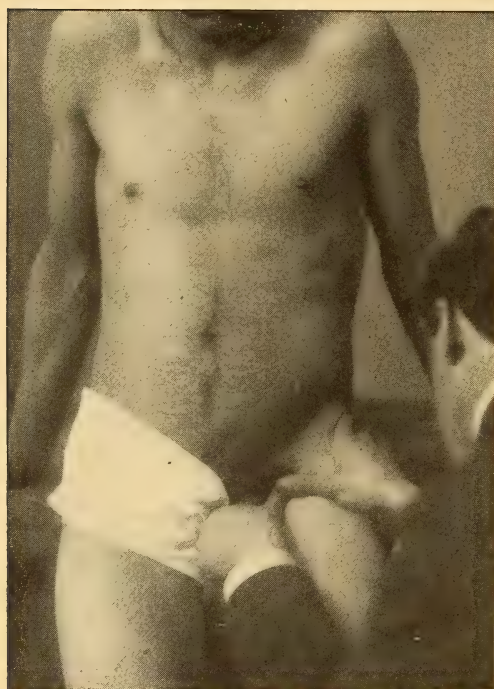
Having thus prepared the hands, do not try to wash or cleanse the wound, except to remove from it all bits of clothing and other foreign matter, using great care not to soil the wound. Next take the gauze compress from the packet, and without allowing anything but the clean hands to touch it, place it over the wound, cover with a layer of antiseptic cotton thick enough to absorb all the blood and serum likely to be discharged, and over all wrap the bandage, drawing it firmly if there is much bleeding, but not so tightly as to obstruct the circulation in the parts beyond. The surgeon seldom uses less than a half pound of cotton to cover a wound and absorb its discharges. Only cotton that has been antiseptically prepared is fit for this purpose. Should the bandage be found too snug it may be loosened a little, but the gauze and cotton should not be disturbed until preparations are complete for the permanent dressing.

If the patient is suffering from shock, or is faint, very weak or pale, he should be put to bed and surrounded by bottles of hot water, securely corked and wrapped in cloths to prevent blistering the patient. Mason fruit jars, carefully sealed, are excellent for this; jugs serve the purpose well. The clothing about the neck, chest and waist should be loosened, if not removed. If ammonia be applied to the nostrils it must be quite dilute and used for only a short time. Do not use large pillows; the horizontal position is best.

THE TEMPORARY DRESSING OF WOUNDS.

Many lives have been lost because of fright at the sight of blood. Paralyzed with fear, the doctor's coming has been helplessly awaited until too late, when the patient, or anyone else, by pressing the right spot, could have stayed the crimson current until the arrival of more skillful aid. No one need bleed to death unless wounded in more places than he can reach with his fingers and thumbs.

HEMORRHAGE.



To Prevent Bleeding from the Femoral Artery at any Place in the Limb Below the Point of Pressure.

The temporary control of hemorrhage is effected by direct pressure in the wound, or by pressure upon the blood vessels above or below the wound. To control hemorrhage directly in the wound, wipe out the clots with a piece of clean absorbent cotton and immediately fill the wound with another piece of dry cotton, pack it in, and pile it up over the wound, then firmly bandage over all. Should the hemorrhage persist, take out the cotton, repack the wound with fresh cotton, and apply the bandage much more tightly than before, if necessary using additional

pressure over the wound with the hand.

If the bleeding be from an artery, it will come from the side of the wound next the heart, and will be controlled by pressure between the wound and heart upon that artery. This pressure will be most efficiently applied at the points shown in Plate V. If the bleeding be from a vein, it will come from the side of the wound furthest from the heart, will be darker in color than bright

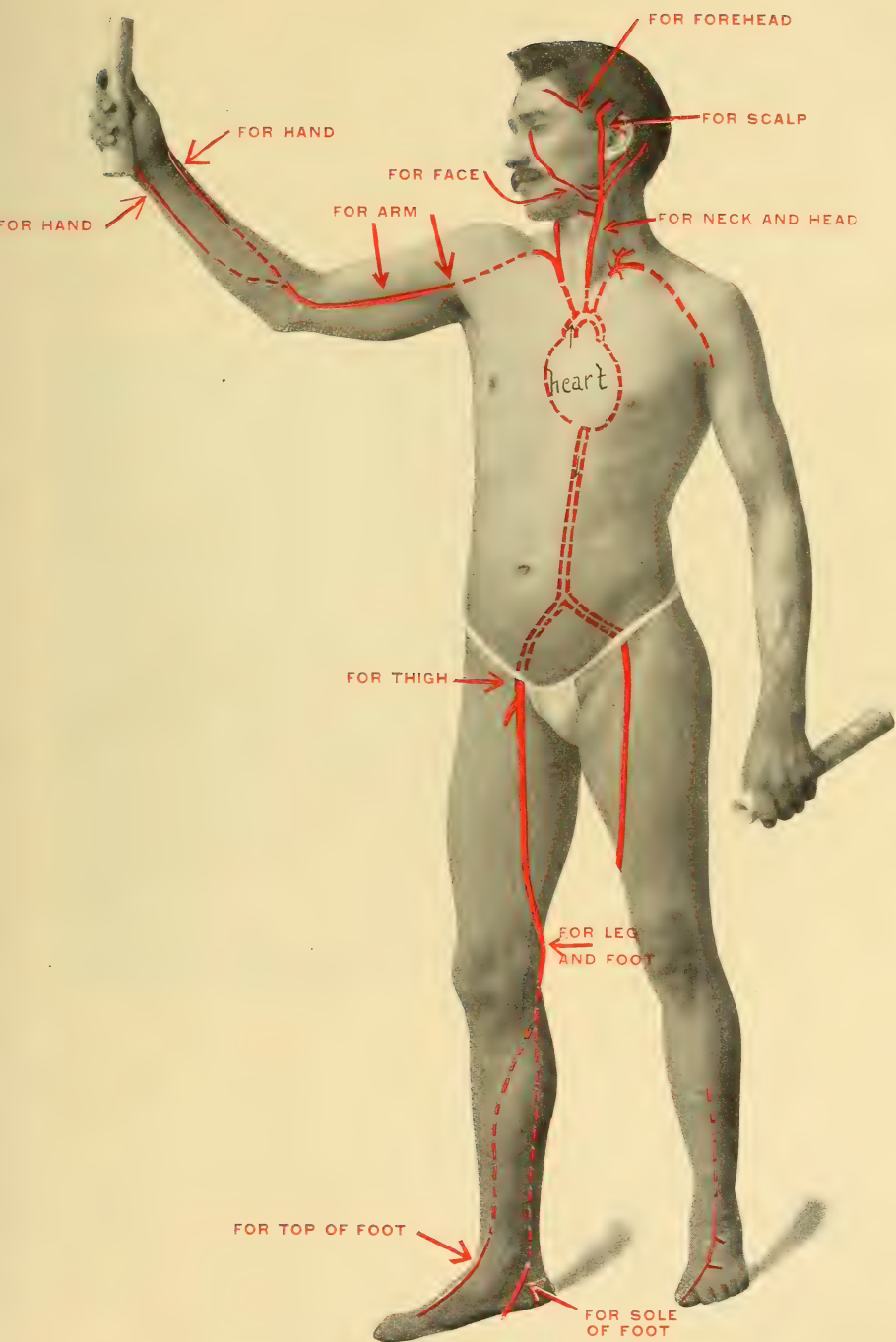


PLATE V.

Points at which pressure controls Arterial Bleeding.

red arterial blood, and will be controlled by pressure on the vein on the side of the wound furthest from the heart. The pressure can often be exerted upon the selected point by applying the hand thereon and throwing the weight of the body upon the hand, the weight to be sufficient to control the hemorrhage.

A better way is to cut or tear a half yard or more of gauze or muslin into strips three or four inches wide, wind them into a firm roll, apply it to the selected point, and over it wrap a

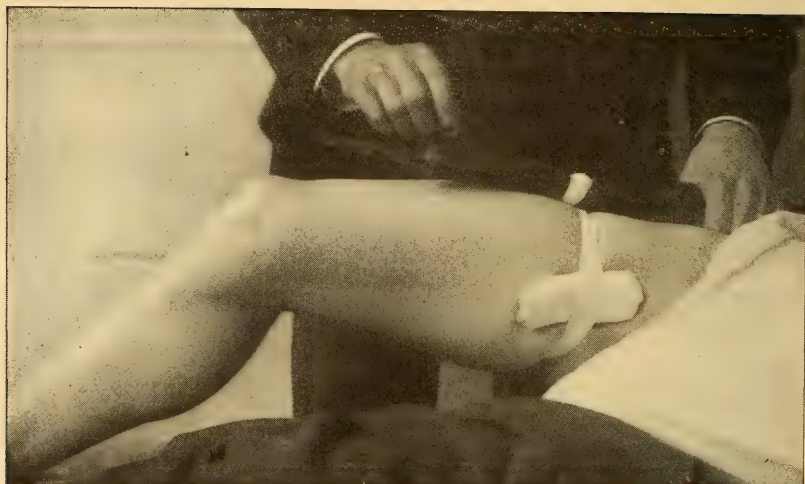


The Tourniquet Applied to the Arm.

bandage very tightly. If it be found impossible to thus bind the artery tightly enough to arrest the hemorrhage, try a tourniquet or "Spanish windlass," i. e., tie a strong bandage loosely about the limb, place the compress over the selected spot and under the bandage, then with a cane or similar lever thrust through the bandage, twist it round and round until the bleeding stops. Where a compress roll cannot be quickly obtained, a ball of any kind, a smooth stone, a block with rounded corners, or even

an apple or potato may be used under the tourniquet bandage to press upon the artery or vein.

Should all these devices prove insufficient, a piece of strong one-fourth to one-half inch elastic rubber tubing can be wound several times around the limb, without any compress, tightly enough to control hemorrhage under any circumstances. If resort to either of the last two methods is required, a surgeon must be summoned immediately, and the limb be left bound but a few hours, for cutting off the circulation too long may result



The Tourniquet Applied by an Assistant to Prevent Arterial Bleeding in the Leg.

in gangrene, possibly in death. These measures, therefore, are to be employed only as a last resort, when the other means have failed, but must be used rather than let the patient bleed to death.



The Tourniquet Applied by the Patient Himself.

As soon as the hemorrhage has been controlled, the wound should be given a temporary dressing as already described.

THE PERMANENT DRESSING OF WOUNDS.

The permanent dressing should be applied as soon as proper preparations can be made, and, for obvious reasons, this should be done by a surgeon. To enable him to secure perfect cleanliness, from two to four gallons of pure water should be provided. It is best prepared by boiling twenty minutes, then cooling in the same vessel, until comfortably warm for the patient. If the time be limited, it is better to boil it in several small kettles, that it may thus cool more quickly than it would in one large one. If, however, the water is pure enough to be good drinking water, boiling is not very important, for it will contain so few disease germs as to be practically clean. One or two dozen freshly laundered clean towels, a bar of carbolic soap, or better still, some of the green soap known as *saponis viridis*, a small hand-scrubbing



To Suppress Arterial Bleeding Below the Knee.

brush of vegetable fiber, and a clean basin should also be provided.

A table is a much better place than a bed for the patient to lie while his wound is being dressed. It should be covered by two or three thicknesses of comforts, or by several blankets, and a clean sheet spread smoothly over them, the patient laid thereon, a clean sheet spread over him, and blankets also if the room be cool, exposing only the wounded limb during the dressing. The table and everything about it, and the patient and everything about him, must be clean, and the site of the wound and its surroundings must be especially clean.

Both operator and assistant should first prepare by cutting their nails as closely as they can be trimmed, and scrubbing their hands and fingers thoroughly, especially about the nails, then

rinsing in clean water until rid of every trace of soap. All preparations having been properly made, the assistant will remove the old dressings and render such other aid as will enable the operator to work with surgically clean hands.

FRACTURES.

A fractured bone is a broken bone, and is caused by violence applied either directly at the place of fracture, or to the ends of the bone so that a break is made at some point between them.

Symptoms.—Pain, following violence, at and about the site of the injury; the patient may have felt or heard the crack when the injury occurred; frequently a crackling or grating sound is produced by the rubbing together of the broken ends. There is deformity, usually a shortening of the injured limb, and a bending from its natural line. Swelling adds to the deformity, and there is likely to be the red or blue discoloration, often termed "black and blue," caused by bleeding into the tissues beneath the skin. Often, but not always, when the limb is moved there seems to be an extra joint—a point of motion where there should be continuous bone. Loss of all strength or force does not often occur, the patient usually being able to move his fingers and toes.

The first thing to do is to "keep cool," then bare the limb without bending it, either by carefully slipping the clothing from it or by neatly ripping up the seams and turning it back; sacrifice the clothing only when necessary to avoid bending the limb. Next, the limb should be drawn into a straight natural position, and as many splints applied and carefully but firmly bound to the limb as may be required to hold the fractured ends rigid and immovable, for there is great danger lest even slight movements of the sharp broken ends lacerate the surrounding tissues, sever an artery, injure a large nerve, or by pushing through the skin open the way for septic poisoning. Almost any stiff object of suitable size may be used as a splint; a board, cane, umbrella, or even a stiff cornstalk will serve the purpose in an emergency. Use the stripped off clothing as padding to prevent the ends of the splints from injuring the limb.

In case of a fractured leg, unless an ambulance be at hand for conveying the patient to his home, or other refuge, a stretcher should be improvised from a board, door, shutter, or something similar. If held by enough hands to keep it from sagging too

much, a strong blanket makes a good stretcher. If there be only two bearers and a blanket is at hand, it may be made into a sling by placing the patient on the blanket and tying its corners together over him, then, by means of a pole, rail or strong board thrust under the part of the blanket covering the patient, he may be safely borne upon the shoulders of his friends. In any case, the bearers should keep step at an easy, swinging pace, to cause as little jarring as possible, or, if the distance be long, they may stand in a wagon and hold the stretcher in such a way as to prevent all sudden jolts. Let every precaution be taken against disturbing the injured limb, or grating the fractured ends upon each other.

From the stretcher the patient should be transferred to a narrow bed, that the surgeon may have access from either side; it should be rather hard and without springs, a board having been placed beneath the mattress to prevent sinking down in the middle.

Do not get excited. An ordinary fracture is not a dangerous accident. It should be reduced as soon as possible, but time is not the element of greatest importance, and it is better to await the coming of the surgeon of your choice than to send in every direction and get several, then have no one to take the individual responsibility of making a perfect limb.

Reducing the fracture, or "setting the bone," is bringing the broken parts together in their natural position and retaining them there by proper splints and bandages. Make no attempt to set the bone, but keep the injured place covered with cloths wrung frequently from clean cold water, and await the surgeon's coming.

Repair occurs when the fractured ends are brought together in the proper position and condition, and held there perfectly still by the aid of splints, usually two in number, bandaged to the limb. The length of time required is considerably influenced by the health and age, but usually is from six to eight weeks.

SPRAINS.

A sprain is an excessive strain of the muscles or ligaments of a joint, without dislocation.

A sprain may be of any degree of severity, from one of little consequence that recovers in a few days without any treatment, to

an injury of very great importance. The joint itself may have been torn open, or the ligaments about it so strained or torn as to produce serious permanent lameness. Hence, a sprain should not be regarded lightly, and, if the injury is apparently severe, a surgeon should be called and his directions followed.



Adhesive Bandage for Sprain.

Treatment.—As soon as possible after the accident immerse the injured joint in very warm water and hold it there from thirty minutes to an hour, keeping the water all the time, by frequent additions of very hot water, as hot as can be borne by the patient. Then, having carefully dried the limb in soft towels, cover the joint and limb for some inches above and below the injury with strips of adhesive plaster running lengthwise of the limb, after which cover that by winding a long strip, about three inches wide, of the same plaster, round and round the limb, drawing it snugly but not so tightly as to stop the circulation, and using care to make each turn slightly overlap the preceding one. This

having been properly done, the patient may immediately resume the natural use of the joint. The modern surgeon does not advise resting a sprained joint, but that it be given moderate use from the first. Do not apply washes or liniments of any kind.

DISLOCATIONS.

The displacement of a bone from its natural joint with another bone is a dislocation.

Symptoms.—The general symptoms are a change in the shape of the joint; lengthening or shortening of the limb; pain in the joint and great difficulty or absolute impossibility of moving it.

Treatment.—To reduce a dislocation is to restore the bones to their natural place, and usually this can be done by the surgeon only. This is especially true of a hip dislocation, the treatment of which would be almost impossible by anyone not possessed of special knowledge and training. In general, as soon as a dislocation occurs, a surgeon should be called, but frequently a dislocation may be reduced by an intelligent bystander through simply pulling the joint apart—having an assistant hold and steady the bone above the dislocated joint, while he pulls on the limb below the dislocation, and in the natural line of the limb. Often this will be followed by the reduction sought, the bones returning to their places and the pain being thereby immediately relieved.

The shoulder dislocation can often be reduced by the operator pulling in line of the arm as it hangs by the patient's side, the assistant at the same time placing his hands in the arm-pit and lifting the shoulder upward and outward from the body. If the bone goes back into its socket with a snap it can safely be considered as all right.

If an attempt to reduce a dislocation is not successful, do not resort to violent measures, but await the arrival of the surgeon, meantime constantly applying cold water to the injured joint, unless it has received an external wound also, in which case only a dry dressing of absorbent cotton should be applied.

When the dislocation has been reduced, the member should be put at rest for three or four weeks by bandaging or splinting the part, thus holding it immovable until the torn and injured parts about the joint have recovered. The larger joints, as the elbow, shoulder and hip, require from five to six weeks for repair.

BRUISES.

A bruise is an injury to the soft parts beneath the skin. When accompanied by an injury to the skin it is called a bruised

wound. The most common causes are blows and falls. Bruises may be of any grade of severity, from a simple bruise of the muscles of an extremity, to the severe pulpification of internal organs.

Symptoms.—Pain, discoloration and swelling followed by heat. In severe or extensive bruises great and even fatal prostration may follow. The blood vessels of the bruised part are likely to be torn so that there is bleeding into the tissues, thus giving rise to pain, usually of a dull, heavy, aching character, and accompanied, frequently, by a certain numbness. Swelling also occurs as a result of the bleeding. Later when this blood comes nearer the surface, it shows through the skin in what are ordinarily known as black and blue spots. At first the color is usually purple, changing after a few days to violet, brown, olive and green, and, lastly, to a yellowish hue which usually disappears within two weeks.

Treatment.—If the bruised part be a limb, it should be elevated as much as possible, consistent with the comfort of the patient, to prevent bleeding from the torn vessels, for this bleeding into the tissues will be much freer, and the consequent swelling much greater, if the limb be allowed to hang low.

Ordinary temperatures favor free bleeding; either very cold or very hot applications should, therefore, be made to the bruised part. Cold should be given the preference, if agreeable to the patient, and nothing is better than a bag of pounded ice, kept constantly applied; should hot applications be more agreeable, they should be used instead of the cold, but whichever is chosen should be continued without interruption for several hours, during which time the very low or very high temperature should be steadily maintained by rapid and frequent changes of the applications.

If the swelling unduly increases, or if the limb becomes cold beyond the bruised part, or if the bruise be in the body and accompanied by prostration, a physician should be called without delay. To overcome such prostration, the patient should be placed as soon as possible in a warm bed, given a hot drink, and surrounded with bottles or sealed fruit jars of hot water, but not of water so hot as to burn, for a patient in this condition may be so numb as not to feel even severe burning. Quiet must be maintained for several days, and twice daily the bruised part should be gently rubbed towards the body.

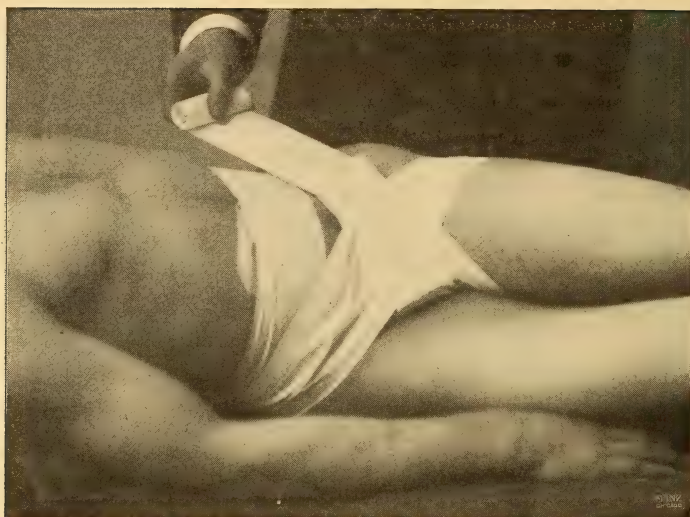
HERNIA.

(Rupture).

A hernia or rupture is a tumor formed by the protrusion of contents of a cavity through its wall, the external skin usually remaining unbroken. Its most common sites are the navel and groin. If at the navel, it is called an *umbilical hernia*. This form is very rarely found except in new-born children and fleshy women who have borne children, and whose abdominal walls have thereby been thinned out and weakened.

A hernia in the groin occurs either just above or just below its fold (Poupart's ligament). If above, it is an *inguinal hernia* the form most common in boys and men, and if the protrusion continues until it pushes down into the scrotum it is a *scrotal hernia*. If it occurs below the fold in the groin, it is a *femoral hernia*, almost the only groin hernia that occurs in females. In the very rare cases in which the protrusion pushes down into one of the labia, it is called a *labial hernia*. A boy or man at any age may have a hernia in the groin, but in the female this rarely occurs until puberty, and usually not until middle or advanced life. Although brought on by severe strain, a hernia is generally due to a natural weakness in the walls. When such constriction occurs as to prevent the passage of blood and feces in the part protruded, the condition is known as *strangulated hernia*.

The new-born child that has a hernia at the navel should be promptly treated by pressing the protrusion back into the abdomen, then applying to the navel a compress composed of several thicknesses of soft cloth, and binding it firmly to its place by a bandage, and this should be worn day and night until a cure is effected by nature's own methods. In like manner a child having hernia in the groin should have the protrusion reduced, a compress applied to the hernial site and firmly bound in place by several turns of a figure 8 bandage, one turn passing around the body, the next around the thigh on the defective side and, coming back, be crossed over the hernia, then around the body, and again around the thigh, repeating these turns until the protrusion can have no chance of escape. This bandage must likewise be worn day and night that the hernial opening may be kept constantly closed and the parts thereby have a chance to grow together. The best material for such a bandage is soft white flannel, cut bias in strips about three inches wide and sewed together end to end until



Bandaging for Groin Hernia in a Child.

the required length is secured. Several such bandages should be provided, as there will need to be changes when they become soiled. In doing this the nurse must lay her finger over the hernial opening and prevent the protrusion of the gut, until the compress and bandage have been reapplied. In babies and children, if care be taken to keep the hernia properly and constantly reduced for a year or two, a cure will almost always follow; but not so with adults, for in them a cure is the exception, rather than the rule.

In an adult the protrusion should be reduced and held in place by a well fitting truss, for when a hernia is out there is always danger of its becoming strangulated, and a surgeon meets nothing in his practice more serious than a strangulated hernia. To secure a perfectly fitting truss the patient should have the aid of his physician, and during the fitting should assume all kinds of postures, as those of lifting, stretching the limbs, and bending the body this way and that, and he should strain in each of these unusual positions, through all of which the truss should hold the hernia in place. If it does not it should be rejected and another applied, and so on until a perfect fit is secured. A truss is not usually worn by an adult at night, but is removed after the patient lies down, then reapplied before rising. That hernia is much more common than most people realize may be seen by a glance at the

magnitude of the truss business; a single city in the United States turns out a half-million hernial trusses annually.

Strangulated Hernia.—Should one be so unfortunate as to have strangulation of a hernia, a physician should be summoned immediately and at the same time be informed as to what has happened that he may not delay in answering the call. The symptoms are pain and tenderness in the hernia; the swelling becomes harder than usual; there are colicky pains through the abdomen, sometimes extremely severe; occasionally the patient sweats profusely because of the pain, even becoming cold and almost lifeless, thus showing that he has entered a very dangerous stage of collapse.



Position for a Patient Suffering with Strangulated Hernia.

Treatment.—A patient with strangulated hernia should be made to lie upon his back, with his hips much elevated. A very good way to get this position is to place a chair so that its top and the front edge of the seat shall rest upon the bed, the back of the chair being pushed under the back of the patient until his hips rest on the rear edge of the seat, his legs from the knees falling over between the chair legs, its back and rounds having been covered with a folded blanket.

A bag of pounded ice, or some other very cold application, should be placed upon the hernial swelling to arrest inflammation,

and in ten or fifteen minutes efforts at reduction of the protrusion should be made by the patient, who is likely to be much more skillful than anyone else in reducing his own hernia. Failing to reduce it, he should be kept in the above position that the blood may gravitate from the swelling, and the cold applications continued until the doctor arrives. Do not apply heat in any form.

The surgeon usually treats such a case by administering chloroform, thereby relaxing the tissues surrounding the hernia, then, having bent the thigh upward and turned it somewhat inward, by gently pressing and kneading with the broad surface of his hands, he attempts to reduce the hernia. If this is not successful, it is his duty to cut down from the hernia to slightly enlarge the opening, thus allowing the gut to fall back into its natural position, then sew the edges of the wound together. To do this properly is usually a complicated procedure.

To effect a cure by means of a truss it must be so applied as to produce great pressure and pain, in fact all the pain that the patient is willing to bear, and the process continued for several days and nights, or even weeks, thereby exciting an adhesive inflammation which shall result in a growing together of the surfaces of the hernial opening. This treatment is much more likely to succeed if applied soon after the hernia first appears. In an old hernia it is not often of much value.

RECTAL PROLAPSUS AND PROCIDENTIA.

Prolapsus of the rectum is a descent of the lower part of the rectum, either partial or complete, the mucous membrane and sub-mucous tissue being turned out of the anus.

Procidentia is the descent of the upper part of the rectum, all its coats, through the anus, the upper part of the rectum descending through the lower part.

Both these conditions, although most common in children, quite often occur in women who have borne many children, and in men of advanced years. In children it is thought to be caused by diarrhea, dysentery, severe coughing, long continued crying, and much straining to move the bowels.

A frequent cause is the bad practice of placing a child upon a chamber and leaving it there a long time.

In adults it may be caused by chronic diarrhea, dysentery, severe cathartics, long continued use of injections, strictures of the urethra, severe straining, internal piles, polypi, tumors, etc.

Treatment.—In children a speedy cure can generally be obtained by removing the cause, but when no source of irritation can be found the general health must be improved. The child must not be allowed to sit and strain at stool, but all movements of its bowels should be made while lying upon its side near the edge of the bed, or while in a standing position, and one buttock should be drawn aside to tighten the anal orifice while the feces are passing. After the movement the protruding parts should be well bathed by dashing cold water upon them with the hand, then thoroughly treated with a solution of alum or oak bark, or weak carbolic acid, applied with a soft cloth or sponge. The bowel must then be gently pressed back through the anus to its natural position, and the child should for some time continue lying upon its stomach. As a rule cathartics should not be given, but where there is intestinal irritation from three to five grains of cascara sagrada may be administered morning and evening.

Hard feces should be softened by mild injections before they are passed, and a repetition of the condition avoided by a diet of gruels, graham mush, and other laxative foods. Only nutritious, easily digestible articles should be eaten by one suffering from this trouble.

The more serious cases usually require surgical treatment, which may include the use of acids, hot instruments and the knife.

GENERAL DISEASES.

CHAPTER I.

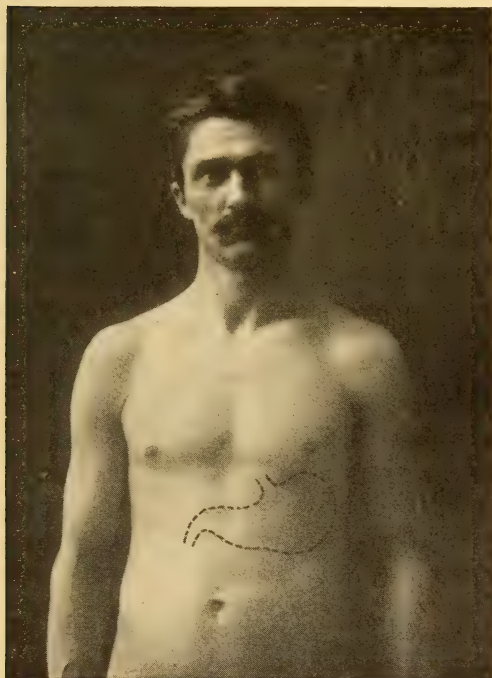
By R. E. McVEY, M.D.

DIGESTION.

The alimentary canal is the great duct by which the foods are conveyed through the body and their useless parts evacuated, and consists of the esophagus or gullet, the stomach, and the small and large intestines. The stomach is the most dilated of these four parts, and besides serving as a reservoir for food, is the principal organ of digestion—the mill which completes the work begun by the teeth. The esophagus opens into it near its larger or cardiac end, and the duodenum—the upper portion of the

small intestine—begins at its smaller or pyloric end. It is composed of four coats or membranes—the external or peritoneal, the muscular, the sub-mucous and the mucous, and between them are distributed the blood vessels, lymphatics and nerves. It is now known to have no villi like those of the intestine for absorbing nutrients.

The size of the stomach varies in different persons, and in the same person at different times according to the degree of its distention, but when moderately



Position and Relative Size of the Stomach.

filled its average length is about twelve inches and its vertical diameter about four inches. It has two movements: A kind of rotary or churning movement whereby the food is mixed with the gastric juice and triturated or broken up into very fine parts, and a peristaltic movement which, as fast as the food is dissolved or reduced to a semi-fluid state called chyme, presses it along and out through the pylorus.

Digestion is the process of dissolving food until, in fluid form, it can pass through the membranes of the digestive canal into the blood. This is accomplished by means of mechanical and chemical processes. The mechanical parts are mastication and the muscular action of the stomach whereby it grinds or disintegrates the food. The chemical part is performed by the aid of ferments. A "ferment" is a substance which works changes in other substances and to some extent alters their chemical composition; thus yeast is a ferment used in bread-making. Saliva is a digestive ferment, gastric juice is another, and pancreatic secretion a third. As derangement of any of these may cause digestive disturbances, it is desirable to know something of the function of each.

Mastication consists not only of carefully chewing the food, but also of thoroughly mixing it with saliva and atmospheric air. The saliva is an alkaline ferment and its action upon the starchy parts of the food is the beginning of digestion. It continues until the food has entered the stomach and, by its presence there, excited glands that pour upon it a thin fluid known as gastric juice. This is an acid ferment, and as starch can be digested only in an alkaline solution, the gastric juice stops the digestion of the starchy materials, but through its affinity for albumen, immediately commences to act upon the albuminoids—those parts of the food containing albumen.

The muscular action of the stomach now begins and, rolling the food over and over, works and rubs it until the two forces, chemical and mechanical, have reduced the entire mass to a half fluid condition called chyme; a task generally requiring from two to four hours. The duodenum, into which the food next passes, is the seat of the most active digestive processes occurring in the whole system. Here the liquefied albuminoids are absorbed by a network of microscopic veins lying within the walls of the intestine; and here the chyme is mixed with the bile and the

pancreatic secretion. The latter is the most powerful of all digestive ferments, and the most complex in composition. It contains diastase to digest the remaining starchy food, trypsin to dissolve the remaining albuminoids, a ferment to act upon milk, and one to act upon the fats and, with the help of the bile, change them into an emulsion, that is break them up into exceedingly minute particles, that they too can be absorbed.

The nutrients derived from the starchy and albuminoid materials are absorbed by myriads of microscopic veins and borne along with the blood to the great portal vein, to be carried to the liver for purification; while the fats are absorbed by another system of vessels called lacteals, borne to the thoracic duct and thence thrown into the blood.

INDIGESTION.

The brief outline just given may serve to show that so many parts compose the digestive process as to make the term "indigestion," as commonly used, a very indefinite one, far too indefinite to be of much value in the diagnosis of disease; that the very part of the work that is being improperly, or not at all, performed must be pointed out before a remedy can be chosen; and therefore that the use of any nostrum or cure-all, though patented, sold ready made and cheap, is much more liable to do harm than good, and that because pepsin has relieved one man's stomach ache it is not sure, or even likely, to help yours.

Diagnosis.—To locate any digestive trouble begin at the beginning and examine the teeth to learn whether they are in condition to properly chew the food. If not, secure the services of a good dentist. This matter should have much more attention than it usually receives. Through lack of care in early life, people are often left without teeth just when they need them most. Although no substitute can make good the loss, artificial teeth, as perfect as possible, should be promptly obtained.

Salivation should next receive attention. How do you eat? If it is your habit to eat hurriedly and bolt the food, not taking time to chew it well, and properly mix it with air and saliva, or if you wash it down with large amounts of drink, especially iced drink, a halt should be called. That it may perform its part of digestion by changing cane sugar and starch into glucose, or grape sugar, the form in which their nutrients are taken into the blood, the

saliva must be undiluted and thoroughly mixed with the food. Refrain from drinking much at meals, since it not only interferes with digestion and impairs the health but, what seems of even more importance to many, is the chief cause, by stomach and bowel distention, of the big, unsightly abdomens so common in middle and later life. Would you long enjoy perfect health, take your food slowly and chew it well. Even a glass of milk is better for being taken slowly, for, as curdling is the first step in its digestion, if it be taken a little at a time, the formation of many small curds instead of one large one makes the remaining parts of the process natural and easy.

The muscular action of the stomach may be so impaired as to render it unable to disintegrate the food, and indigestion follow. This may result from a diseased condition of the muscular coat, or from ulcer or cancer. Disease of the muscular coat is usually some form of gastric catarrh, often, but not always, accompanied by catarrh of the nose and throat. Gastric catarrh in its chronic form is known by many as chronic dyspepsia. In this stage pain amounting to a burning soreness is felt back of the breast bone and is sometimes increased by taking food. There is often tenderness, nausea, some retching, furred tongue with constipation, sometimes diarrhea, belching, dilatation, regurgitation, acidity of the stomach, foul taste in the mouth, heartburn, sore mouth, headache, dizziness, drowsiness but sometimes sleeplessness, nervousness, mental confusion and sometimes insanity.

In all of these cases the chief remedy is a modified diet. The food must be so prepared and of such kinds as not to require disintegration. In the milder forms of the disease it may be sufficient to avoid such food as has been found to disagree with the patient, and all foods not easily disintegrated, such as pork, veal, pastries, etc., but in severe cases a very strict diet must be enforced, and all the food be in fluid or semi-fluid form, as milk, milk-gruel, beef juice, beef tea, mutton broth, or some similar preparation, to most of which some baked flour can often be added with advantage. In this disease the effectiveness of the muscular action of the stomach is often greatly diminished by the presence of an excessive amount of mucus that binds the food together in a tenacious mass about which, as the mass rolls over and over, it forms an insoluble coat so that the action of the gastric juice is also very much impeded, and little digestion of any kind can be effected until the materials finally pass from the stomach into the intestine.

Treatment.—The stomach should first be thoroughly washed out. This may be done by taking five to ten grains of ipecac in a half tumbler of warm water. If free vomiting does not follow, assist by tickling the throat. The work is done in a much more thorough and better way by means of a stomach tube and salt and water, a teaspoonful to the quart. The best time for doing this is at bed time or four to six hours after eating, and the temperature of the water should be as nearly that of the body as possible. The stomach tube is made of very soft flexible rubber, is about a half inch in diameter and expands at the upper end to form a funnel. When the lower end has been placed well back in the patient's throat he swallows it; when some fourteen inches of the tube have thus been taken, the assistant pours about a pint of water into the stomach, then, as he lowers his end, the tube becomes a syphon, or the patient by straining or coughing a little expels the water through the tube and with it the mucus and whatever else is there. Repeat the process until the water drawn out is clear. It is not difficult to swallow the tube after the first time and its use not only immediately relieves the patient of a very injurious and loathsome mass, and cleanses the stomach thoroughly, but it reveals, better than any other method, the exact condition of the stomach itself. The use of the tube should be continued every other day as long as such relief is required, and an hour later give ten grains of papoid to check the formation of more mucus. Powdered charcoal is also an excellent remedy.

To restore activity to the muscular walls, after the washing out use the following: *Nux vomica* ten grains; phosphide of zinc three grains; mix, make into thirty pills and take one immediately after each meal. This remedy should be taken only upon a full stomach. In this, as in all cases of inefficient stomach disintegration, diet is the main remedy; but remember that too often a "course of dieting" is made a course of starving. Diet in this connection does not mean a rigid cutting down of the food supply, but a very careful selection of the kinds of food.

The body needs to be thoroughly nourished at this time and care must be used not only to take the right food in the right form at the right time, but to take enough of it to keep the nutrition fully up to, or above, what it has been, always guarding, however, against overeating. It is of great importance to take the meals at regular hours and to eat nothing at all between meals.

Ulcer and Cancer are both indicated by pain in the stomach, aggravated upon taking food, and it is not always easy to diagnose between them. Cancer is most common in the male sex above the age of forty and is usually found in the pyloric or lower end of the stomach. If there be an increase of pain immediately after taking food it is probably due to an ulcer in the upper end, but if the increase comes later a lesion in the lower end is indicated and, if it be a cancer, it can usually be felt with the hand as a hard lump or tumor in the stomach just below the ends of the right ribs. The appetite is often abnormal with cancer and the patient craves things that in health he would loathe, but with ulcer this is not the case. With ulcer the pain is generally relieved by vomiting, but with cancer it is not. As long as the stomach is at rest there is likely to be no pain with ulcer, but with cancer there may be pain at any time, and, as the disease progresses, the pain becomes continuous. In either case, or for any irritation of the mucous coat, twenty grains of subnitrate of bismuth in a tablespoonful of water should be taken just before each meal to form a coating over the affected parts and prevent irritation and pain. The same diet must be used as in cases of gastric catarrh.

CONSTIPATION.

Constipation is an unnatural retention of fecal matter in the bowels, and is a most common disorder. It is almost always present in dyspepsia, precedes and accompanies most other diseases, and often follows them. Its causes are many, but chief among them are too much sitting and too little outdoor air and exercise, too rich food, the use of opiates, and of tea, coffee, tobacco and other stimulants, inactivity of the muscular coat of the intestines, intestinal catarrh, intestinal strictures, taking medicines for every slight ailment, too frequent use of injections and neglect to heed the calls of nature; the last named being a very frequent cause. The health very largely depends upon regularity of the bowels.

The seat of the trouble is the large intestine. This organ is so called because of its size. It is about five feet in length; its upper, middle and lower portions being the cecum, colon and rectum. The contents of the bowels are gradually carried down into the rectum, where their presence excites a desire to discharge them; but if not gratified this desire soon ceases, for the peristaltic

action of the intestine presses the feces up into the colon again; in which case their liquids are absorbed and their poisonous impurities taken into the blood, often causing great derangement and very serious disorders.

The liver in its efforts to throw out the poison becomes overworked and disabled, and is often wrongly blamed as the cause of the trouble, although at the same time the blood may be so charged with fecal matter as to badly contaminate the breath of the patient. The kidneys may become clogged with the excess of impurities, the circulation of the blood be impaired, resulting in cold feet and limbs, and the stomach, pancreas, spleen, heart and brain all partake of the general disorder.

There is great difference in the frequency with which healthy people have action of the bowels. Some move them more than once a day; others only once in two or more days; but when the usual number is not maintained, and at the same time there is discomfort, a condition is indicated which calls for treatment. No one who is irregular in this respect can long enjoy good health.

Symptoms.—Infrequent movement of the bowels; hard, lumpy feces, voided with difficulty; inactive liver; foul breath; bad taste in the mouth in the morning; variable appetite; transparent urine; sallow complexion; headache; mental depression; palpitation of the heart; piles; cold feet and a tendency to take cold upon the slightest exposure.

Treatment.—As much as possible remove all the causes. If the patient has been much confined within doors he should take abundant outdoor exercise, of which, for most people, horseback riding is the best. A change to an outdoor occupation is an excellent way of restoring this function. The bowels should be moved every day, and the best time for this is just after breakfast. Always obey nature's call immediately. If there has been no movement, take a little gentle exercise and half an hour after breakfast sit down in the privy and wait fifteen minutes, making frequent efforts.

Vigorously kneading and striking the bowels with the hands for five minutes or more several times each day is often a great help. The diet must be such as to assist in this work. If the stomach will tolerate it the food should consist of coarsely-cracked boiled wheat, preparations from graham, Ralston flour and unbolted meal, and fruit, either fresh or dried. Fresh fruit is best.

The meals should always be taken at regular hours and all piecing or eating between meals prohibited. It is unwise to drink much during meals, but water should be taken freely an hour and a half or two hours later. Drinking a glass of water before breakfast has been known to do the work; if found to be ineffectual it should be discontinued.

Injections are often a help, and their efficiency may be increased by adding a little salt or soap, but the more injections are used the more the need for them increases, until the bowels will not move at all without them. They should, however, be used before a movement when the feces have formed into large lumps and become dry and hard. Applications of electricity, also of heat, to the abdomen are recommended. By patience and a thorough persistence in the use of the above simple means the most obstinate cases may be overcome. It is better not to use many drugs, for, as already seen, drugs frequently cause the disease, but where there are insufficient fluids and diminished peristaltic action, from five to ten drops of the tincture of *nux vomica* in a glass of water three times a day is a most valuable remedy, correcting the constipation without the debilitating and other bad effects produced by most cathartics. By acquiring habits of regularity in early life, then persisting in them, most cases of constipation can be avoided.

DIARRHEA.

Diarrhea is a morbidly frequent evacuation of the bowels, the stools being more or less fluid in character. It is called acute or chronic accordingly as it is of short or long duration. As a rule affections of the large intestine give rise to dysentery and those of the small one to diarrhea. At least three conditions may occur in the small intestine, any one of which may cause diarrhea. They are an increase in its peristaltic movements, an increase in its secretions, and a diseased condition of its mucous membrane. Two or all of these conditions are often present at the same time. In diarrhea there is very little if any blood and, next to watery serum, mucus is the most common and constant admixture with the feces, and when present of course indicates a morbid condition of the mucous membrane. Although the discharges are always more or less fluid their character changes with the progress of the disease; and they may range in color from a light yellow to a dark brown; in infants they are often green, and in adults are sometimes so fluid and pale as to look almost like rice water.

ACUTE DIARRHEA.

The exciting cause is often very definite. Mental excitement, exposure to cold, irritating foods or medicines, food but partially cooked, food that has commenced to decompose, chunks of meat, green or over-ripe fruit, some kinds of plums, raw vegetables, as cabbage, celery, radishes and cucumbers, raw dried fruit and impure drinking water, especially that containing animal or excrementitious matter, may any of them cause diarrhea. It may also be caused by water impregnated with sewer gas, such as usually found in cisterns with overflows opening into the sewer.

It is a very fatal disease in infancy and is most frequent among those living amid bad surroundings, the poorly nourished, and those suffering from or predisposed to other diseases. It is most common in infants from six to eighteen months of age and its ravages, in the north temperate zone, are greatest in July. Among its causes in infants the following are prominent:

1. Improper food. In the very young, food containing starch will provoke it, because infants until about six months old cannot digest starch. They should not be fed anything but milk. If the mother's milk be not sufficient, cows' milk should be the only substitute, and, as bacteria cause a large proportion of the diarrheal disorders in artificially fed children, care should be taken to get milk that is as fresh and pure as possible and, in every case, to properly sterilize and modify it before feeding.

2. Irregularity in feeding.

3. Exposure to cold. Very young children must be protected against sudden changes of temperature, and, if predisposed to diarrhea, must, while in health as well as while suffering from an attack of the disease, wear soft flannel next the skin.

4. Weaning in hot weather. Except in cases of emergency, a child should never be weaned during hot weather.

5. Increase in atmospheric heat. The prevalence of the disease increases as summer advances until mid-summer is reached, after which it usually gradually subsides. Although very common in warm weather among children cutting teeth, it is by no means a necessary accompaniment of dentition, and then, as at all other times, thorough means should be used to effect a cure.

Diarrhea of mild form may be attended by very little disturbance of the general health in adults, though to the aged and those in middle life who have been weakened by other diseases it may some-

times prove fatal, but to infants it is a very dangerous disease, a slight diarrhea often causing great loss of vital power, as indicated by coldness of the extremities, dark color and sinking in of the spaces around the eyes, and depression of the fontanels (spaces between the skull bones); the last being a most valuable sign, since it may give warning of danger at an early stage of the disease, when otherwise there may seem to be little if any cause for alarm.

Epidemics of diarrhea are thought to be due usually to a common cause rather than to contagion or infection, but, as some forms of the disease are caused by germs, it is a wise precaution to carefully disinfect the discharges and all clothes soiled by the patient and, as much as possible, to avoid exposure to the disease. Unless prolonged by continued use of bad water or bad food, or by bad surroundings, acute diarrhea runs its course in a period varying from a few hours to a week or ten days.

Symptoms.—The following are symptoms, though they may not all be present in one case: Looseness of the bowels or purging; pain in the abdomen; nausea; vomiting; foul breath; headache; gas; faintness; dizziness and a sense of great weakness. Children more often than adults have fever with diarrhea, but more frequently the surface, especially of the hands, feet and limbs, is cold.

Treatment for Adults.—In an adult it is not best to immediately check a diarrhea of mild form lest the patient be thrown into some more serious disorder; but if the attack be of any severity he should seek absolute rest in bed; and heat should be applied to the abdomen, or a mustard poultice used instead, or a layer of batting be spread over the abdomen and covered by oil-linen to retain the animal heat, and care must be taken to keep the feet and limbs warm. First give from one to two tablespoonfuls of castor oil to clear the stomach and intestines of all irritating substances. If preferred, the patient may take rhubarb instead, but it is not as good a remedy. Ten hours later he should take from fifteen to forty-five grains of subnitrate of bismuth, and repeat the dose after each movement.

Great benefit is often derived from an injection. It should consist of a quart of water that has been well boiled, then cooled to the point of endurance, thrown into the rectum with a syringe and retained as long as possible. The hotter it can be taken without burning the more it will relieve pain. Cloths wrung from ice water and applied to the rectum are an aid.

Although prescriptions containing a large number of ingredients are not as highly favored now as formerly, the following has given such excellent results, and can be so easily kept on hand for a household remedy, we recommend it:

Laudanum	two drams
Spirits of camphor	two drams
Tincture of rhubarb	two drams
Tincture of myrrh	two drams
Tincture of Cayenne pepper.....	one dram

Give from five to thirty drops after each movement until the bowels are controlled. This sometimes succeeds where bismuth fails.

The patient will often be greatly helped by an abdominal bandage. It should be a strong soft cloth about a foot wide pinned snugly around the body. Soft flannel underclothing should be worn during the attack and until full recovery; by those predisposed to the disease it should be worn all the time.

The diet should consist of beaten eggs cooked in water, boiled milk, either pure or diluted with lime water, boiled rice and milk, broths, beef tea and other bland articles. Until full recovery the patient must refrain from meat and all rich and irritating food.

Treatment of Infants.—Although in adults it is not best to check a diarrhea immediately, in children it should be arrested at the very beginning, or as soon thereafter as possible, for with them it often does its work quickly. First give castor oil, a teaspoonful to a child of from three to six months, and proportionally more to those that are older, and in five or six hours give from five to ten drops of paregoric, or from five to ten grains of subnitrate of bismuth, after each movement. It should take very little food for twenty-four hours, after which its diet should be breast milk, thin broth, or fresh milk that has been properly sterilized and modified, and to which a little lime water has been added.

To guard against another attack the careful feeding should continue five or ten days after recovery. Until quite well the child must be kept very quiet in bed, for running about at this time is very injurious.

CHRONIC DIARRHEA.

This is the name generally given to a diarrhea lasting more than fifteen days; it is, however, a very different form from acute

diarrhea, and may last months or even many years. The intestines may then present appearances thought to be due to chronic catarrhal inflammation, but in many cases examinations made after death have failed to disclose any change at all in the intestines, although the patient had suffered a very long time from this disease. Bad surroundings, old age, an enfeebled constitution, chronic disorders of digestion, all are predisposing causes. It is so uniformly present in tuberculosis, typhoid fever and syphilis as to constitute prominent symptoms of those diseases.

In addition to what has been said, an extended description is not needed to enable anyone to recognize a case of chronic diarrhea, but it may arise from so many different causes, or complications, as to baffle the most skillful physician in his efforts to prescribe a cure. In general it may be said that the same remedies and diet should be used in this as in the acute form, but they must be used a long time steadily and with great persistence. Astringents are often valuable here, although they should not be used for the acute form.

As long-continued diarrhea steadily saps the strength, means must be used to keep up the vitality. For this purpose beef juice is excellent, for by its use the patient obtains the nutrients of the beef without incurring the risk of injury from its coarse and irritating fibers. It is prepared by cooking good steak just enough to heat it through, then, while hot, extracting its juice with a press or lemon squeezer, and salting to the taste. The white of an egg, whipped into foam and eaten with boiled milk, is also recommended. To increase its richness a teaspoonful of sugar of milk (not cane sugar) should be added to each tumblerful of the milk.

Slices of white bread, kept in a moderately hot oven until brown and crisp clear through, eaten with boiled milk, is a very valuable food at this time. In both of these dishes a little lime water should be added to the milk to aid in its digestion. Both are better eaten hot.

DYSENTERY.

Dysentery is an inflammation of the rectum or colon, attended with griping pains, constant desire to evacuate the bowels, and discharges of mucus and blood. There is likely to be chilliness followed by high temperature, ulceration of the intestine and

burning pain in the rectum. In the epidemic form the disease is infectious, being due to germs, and to prevent its spread great care should be taken to disinfect the discharges, and all articles used about the patient as soon as removed from him, and only the nurse should be admitted to his room.

Treatment.—To cleanse out the intestine the patient should take a tablespoonful of Epsom salts in a glass of hot water, and each evening at bedtime be given an injection made up as follows:

Laudanum	fifteen drops
Quinine	twenty grains
Subnitrate of bismuth.....	forty grains
Water	four to six ounces

which should be held in the rectum as long as possible.

Although he may feel able to be up, the patient should remain quiet in bed, and should be kept warm, especially his feet and limbs. Sponge the body with water and vinegar or alcohol to cool the burning skin, and wash the anal region often with a disinfectant, such as a solution of boric acid, after which anoint the rectum with vaseline. Cold applications, such as recommended for diarrhea, may also be made to the rectum. To relieve pain in the bowels apply heat to the abdomen. The diet should be restricted to a small amount and should consist of such articles as named in the treatment for diarrhea. There should be no cold food taken, and tea, coffee and tobacco should be let alone. If properly treated the patient will soon be well, but to prevent a recurrence he should guard against exposure, improper food and overexertion for some weeks.

Obstinate cases of chronic dysentery are thoroughly cured only by a sea voyage, a sojourn at the seashore or in the mountains, or some other change of climate and surroundings.

CHOLERA MORBUS.

Cholera morbus is thought by some to be a form of acute gastric catarrh which extends to the mucous membrane lining the intestines, but it is quite as likely that it is often a result of nervous exhaustion. It most often occurs in hot countries but is common throughout the temperate zones, and is most frequent there during the middle and latter parts of summer when the days are hot and the nights are cool. It is found also among adults, but is most frequent in youths and children.

In hot weather persons of very nervous tendencies, those undergoing severe nervous strain, and those much reduced by great bodily fatigue are the most liable to the disease, a fact that has led to the belief that because of exhaustion of the motor nerves of the stomach the digestive processes are impaired and food, remaining longer than it ought in the stomach, gives rise to poisonous fermentative products, irritating to the sensory nerves and exciting more and more disturbance.

It is so called from the close resemblance of many of its symptoms to those of Asiatic cholera, but the two are very different diseases. Cholera morbus is characterized by very severe abdominal pain centering near the navel, nausea, violent and frequent vomiting, purging of watery stools, very painful contraction of the muscles, especially of those of the calf of the leg and the extremities. The countenance has a pinched, sunken appearance and is of a pale or bluish cast; the pulse becomes weak and very rapid; breathing is difficult; the mouth and tongue are dry and there is great thirst. The surface of the body has a shriveled look and is cold, but the internal temperature may range from 99 degrees to 102 degrees. Because of the transudation of serum into the stomach and intestines the blood constantly becomes thicker and the secretions, especially the urine, are greatly diminished, if not entirely stopped.

The attack often comes in the night and usually is very sudden. The food last eaten is first vomited and appears but little changed, but as vomiting is repeated there are large quantities of pale yellow or greenish fluid thrown out with great force; there is rumbling or gurgling of air in the intestines; the stools become thin and fluid, and the greater their quantity the less their color until they assume a rice-water appearance; the voice becomes faint, the patient weakens rapidly and there are signs of a general collapse. But no matter how bad the symptoms or how great the depression of the patient, a previously healthy adult almost always recovers in a few hours, though an attack may last three days. Usually the vomiting and purging gradually grow less frequent and the exhausted patient falls asleep to awake in a few hours greatly restored.

Treatment.—The treatment must be adapted to each case. If begun before sufficient vomiting has occurred to clear the stomach of all undigested food, emetics of hot water and mustard

flour or common salt should be given and repeated until the stomach is thoroughly emptied; but if there be frequent vomiting of green watery material containing no undigested food, and there be much purging, pain, cramps and great weakness, a hypodermic injection, consisting of one-eighth of a grain of morphia and one-two hundredth of a grain of atropia, is the best remedy, and if the patient is not greatly relieved another should be given in two hours, care being taken in every case to first thoroughly disinfect the syringe by placing it in alcohol or boiling water. It is better not to give brandy or any other stimulants, in connection with the morphia. To patients who object to hypodermics a tenth of a grain of calomel should be given every half-hour until ten doses have been taken, and with every other dose one-twentieth of a grain of morphia should be given by the mouth. The extremities should be warmed by free friction and applications of heat, as hot water bottles and the like. In case the vomited material be strongly acid, bicarbonate of soda and subnitrate of bismuth, five grains of each, may be given. Unless the vomiting is excessive it is better not to try to check it. In mild cases children may require no other medicine than a dose of castor oil, but calomel, in one-tenth-grain doses every hour until eight or ten have been taken is a better remedy. Bits of ice are good to quench thirst, but ice-cold ginger ale, a half glass at once, is excellent, and, if the ale cannot be obtained, hot ginger tea is good to restore tone to the stomach. As this organ needs absolute rest no food should be given for a long time, and then the diet should be very light and consist of easily digested and nutritious food.

Cholera morbus very rarely proves fatal except in weak or aged people, or in children; to the latter, especially, it is a dangerous disease. To guard against a second attack indulge but sparingly in iced drinks, avoid exposure to night air, dampness and sudden changes of temperature, protect the body with plenty of blankets at night, discard all green or over-ripe fruits and foods liable to fermentation, and attend promptly to attacks of indigestion and all irregularities of the bowels.

COLIC.

Colic, from a Greek word which signifies pertaining to the colon, is a term that, properly used, applies only to such affections as are attended with severe pain in the abdomen and with spas-

modic contractions of the muscular walls of the intestines, but many of the symptoms are so similar to those of neuralgia of the intestines (enteralgia) that the name is also often applied to the latter disease; hence, to be explicit, some writers designate the former as intestinal colic. Its causes are numerous, but the principal ones are direct irritation of the bowels by green fruit, stale or decaying vegetables, or other improper or undigested food, acrid or poisonous substances, ices, cold drinks, excessive secretion of bile, retained feces, as when associated with constipation, gas, foreign bodies, as fruit-stones or worms, various forms of intestinal obstruction, the morbid conditions of the blood sometimes attending gout and rheumatism, taking cold, lead poisoning, disorders of the nervous system, strong emotion, etc. Similar symptoms may be caused by reflex irritation, as in ovarian and uterine affections, and by the passage of kidney stones or gall stones.

Symptoms.—Attacks of severe pain in the abdomen, often very sudden and intermittent, usually most severe about the navel but sometimes spreading over the whole abdomen and liable to change from one place to another; sometimes so intense as to become excruciating agony, known as twisting, tearing or griping pain. Pressure almost always gives relief, the patient bending over something, as the back of a chair, or pressing the abdomen with his hands, or lying upon his stomach. The bowels are usually constipated and distended with gas, but sometimes there is diarrhea. The spasmodic movements of the bowels and their motions from the rolling about of the gas can sometimes be seen, felt and heard. The abdominal muscles are often knotted or rigidly contracted. There is no fever. Vomiting may occur, but in that case the difficulty is likely to be in the stomach. The attack may finally end as abruptly as it came, and be followed by great relief and comfort, but on the other hand it may last so long and be so severe as to threaten collapse.

Treatment.—The first thing to do is to stop pain and spasm, then find and remove the cause if possible. An injection of water as hot as can be borne, to which has been added twenty drops of turpentine or two teaspoonfuls of tincture of assafoetida, is generally useful if there is much gas, or a brisk purgative may be given by the mouth. In children, especially, the large intestine may often be relieved of gas by gently inserting through the anus a long flexible tube, the patient lying face downward with his

shoulders lower than his hips. In less urgent cases a full dose of castor oil is recommended, and this is often best preceded by one-tenth of a grain of calomel every hour until one grain has been taken. Hot drinks, as peppermint, anise, or wintergreen tea, may afford relief in the milder cases. The patient should be covered warmly in bed and applications of heat, as hot water bottles, hot sand bags, or hot fomentations, be applied to the abdomen and renewed as often as they cool. Gentle friction is also an aid.

A little whisky and hot water is often a good remedy. If an opiate is given, paregoric is the best; dose from ten to forty drops. For severe cases a hypodermic injection of morphia is the best remedy to give quick relief, but a few cannot take this drug and there are very serious objections to using it at all. One-third of a grain of morphine paralyzes the peristaltic action of the intestines for ten or twelve hours, and, without removing the cause, so quiets or deadens the pain and tenderness in the bowels as to make it impossible in many cases to distinguish the comparatively harmless forms of colic from those caused by intestinal obstruction, the early relief of which by surgical means is often necessary to save life. For this reason many of the best physicians no longer use morphine in treating this disease.

Chloroform or ether by inhalation, or by the mouth, is excellent, but these remedies should be used sparingly, with great care, and under the direction of a physician. Use stimulants to combat threatened collapse. The patient may be greatly prostrated at the end of the attack, but gets well. Careful attention to diet and general hygiene should then be exercised to guard against other attacks.

For enteralgia a gentle galvanic current is often the best remedy. See "Neuralgia." For the lead poisoning cases see the chapter on "Poisons."

INTESTINAL OBSTRUCTION.

Intestinal obstruction may be caused by intussusception, which is a drawing or telescoping of the intestine into itself, as a part of the finger of a glove may be drawn into another part; by contraction of the diameter of the intestine; by a twisting of the intestine upon itself; by an entanglement of the intestine known as strangulation; by compression, as from tumors or other morbid growths, or from uterine displacement; and by impac-

tion of hardened feces in the lower end of the large bowel. The latter condition may be relieved by carefully removing the feces with the handle of a spoon or similar instrument, or better, by inserting the finger into the rectum and with it breaking up the feces, introducing water during the process as may seem advantageous; then, as soon as a way is opened for it, administering a large injection of soap and water and repeating as often as necessary to thoroughly empty the bowel. As the other forms of intestinal obstruction are usually serious and demand early attention, and are likely to need very skillful treatment, they should be promptly placed under the care of the best physician. Irreparable injury might be done by giving a severe purgative, or by waiting too long before applying the right remedy. They are too serious for domestic treatment.

Symptoms.—The symptoms of obstruction are extreme pain in the intestines, persistent vomiting, vomiting fecal matter, impeded respiration, anxious expression, cold sweat upon the forehead, bowels enlarged with gas, constipation, great prostration, and, in bad cases, persistent hiccough.

SEA-SICKNESS.

Sea-sickness is generally defined as a nervous affection, attended with nausea and vomiting, produced by the motions of a ship at sea, but it is identically the same condition as that sometimes caused on land by such unusual motions as riding backward, going swiftly up and down in an elevator, swinging, turning rapidly, etc. The experiences at sea are more serious since their cause is more prolonged.

The real nature of sea-sickness has never been explained. Some persons have it every time they take a voyage, others have it but once, a few never have it at all, and it comes in calm weather on a smooth sea to a few who are not affected in the strongest gales. It may last but a few hours, or may cling to one as long as the voyage lasts, but it almost always ceases as soon as the patient lands. In many cases it leaves its victims in much better health than they had before it attacked them, especially such of them as were affected with disorders of the liver or digestive organs, melancholia, or intermittent fevers. To those suffering with organic stomach, heart, lung or brain disease, and to pregnant

women, it is dangerous; and such persons should not take sea-voyages.

As preventives, exercise in swings, and taking medicines, are of little avail, but eating only light, easily digested food for three or four days before going on board is a wise precaution. Many sailors recommend wearing a tight girdle. If the voyage is to be a short one, sea-sickness may be diminished or escaped entirely by taking one's bed as soon as any nausea is experienced, retaining the horizontal position for twenty-four hours, keeping a bag of ice upon the back of the neck, keeping the eyes closed, and eating very little, and that only of the lightest food. Indeed, after a day or two of this, many persons find themselves able to go about ship without further difficulty. As the smell of bilge, and other foul odors, in unventilated parts of the ship, are liable to aggravate the difficulty, the patient, after this preliminary, is likely to be better off when dressed warmly and in the open air.

Treatment.—To control the nausea and vomiting, wash out the stomach with a tube; keep the bowels regular, by using a hot enema if needed; apply heat to the stomach and ice to the spine opposite the stomach; lie quietly in bed, and quench thirst either by holding in the mouth bits of ice or drinking sparingly of hot liquids. Things that work well in some cases fail in others. Effervescing citrate of magnesia, soda water and lemon juice are all good remedies. Sucking an orange will sometimes restore the normal tone to a debilitated stomach. When the appetite returns, eat very moderately and only of light, easily digestible foods. Avoid all sweets, alcoholic drinks, fried foods, pastries, and the like.

APPENDICITIS AND TYPHLITIS.

The vermiform appendix is a small tube or gut attached to the back part of the cecum (upper portion of the large intestine). It is about as large as a goose quill, from three to six inches long, may be either curved or straight, and at its free end comes to a sudden or blunt termination.

Its purpose was long a puzzle to anatomists, but the best authorities now regard it merely as a remnant of the subsidiary stomach of the lower form of life from which man has come, and that it is of no use whatever to the human organism. In many persons it is entirely wanting and from many more it has been removed without, in the least, impairing any function of the

body. In health it is filled with a tough mucus, and for several years in childhood is partially closed by a valvular fold of mucous membrane at or near its opening into the cecum.

Inflammation of this appendix is called appendicitis.

Inflammation of the cecum is called typhlitis.

Many writers hold that the latter is always an outgrowth from the former disease—the inflammation beginning in every case in the appendix and spreading from it to the large intestine. Be that as it may, the two disorders are so closely related, and our space so limited, we will follow the usual custom of considering them both under the general head of typhlitis.

About half the cases of appendicitis are caused by hard substances in the appendix, for when they have made an entrance it has no means of expelling them. These substances sometimes remain in this structure indefinitely without doing any harm, but in other cases, sooner or later, lead to inflammation and most serious consequences. Such foreign bodies as intestinal worms, seeds, pills, bristles, pieces of bone, shot, etc., may be exciting causes, but by far the greater number of cases are occasioned by small stones, called concretions, formed from fecal matter and often closely resembling a cherry stone in appearance. Tuberculosis (consumption) is sometimes the cause, and other germs or disease virus may start the inflammation, but in many cases it has been impossible to discover any cause. It may occur at any time of life, but is most frequent between the ages of twenty and thirty years, and more common in the male sex, due, it is believed to the female appendix having an additional artery and a better blood circulation than has the corresponding structure in the male.

As already explained, the inflammation soon extends to and involves the cecum, thus becoming typhlitis. It is sometimes impossible to distinguish this disease from a case of mechanical obstruction of the bowels; many of its symptoms are like those of local peritonitis, and some of them resemble those of typhoid fever, so, as a rule, it is only the milder cases that can be satisfactorily diagnosed—those in which inflammation has not extended beyond the serous covering of the cecum and the adjacent parts.

Symptoms.—Pain, likely to be spasmodic and of great severity; tenderness, often so great that the patient cannot bear

the slightest touch; nausea, vomiting and constipation, all usually very persistent; loathing of food; heavily furred tongue and foul breath; a stooping posture and disinclination to either stand or walk; a sensation in the right leg as of ants crawling over the skin; hard, quickened pulse; scant, high colored urine; often the first symptom is a chill, closely followed by acute pain, which soon becomes constant and terribly severe, and the anxious look and appearance of suffering seen in peritonitis is observed. An ill-defined, rounded swelling extends upward from the iliac region (the point of greatest tenderness) toward the right loin, principally due to the accumulation of fecal matter in the cecum. Its form and size may change from day to day, and if the disease subsides the swelling gradually disappears.

Treatment.—The patient must be kept perfectly quiet and the diet be only liquid food, and but little of that. Not a bit of physic should be given, but opium should be freely used, just as in treating peritonitis, and the same precautions must be observed before beginning its use. When the disease subsides the greatest care must be used to prevent a relapse, for the disease is very prone to recur even after a considerable time. Give only liquid food for quite a number of days after all need for the precaution seems to have passed, and move the bowels only by use of injections. Very slight straining or exertion may result in perforation, which is usually recognized at once by the signs of collapse, death quickly following. The disease usually runs its course in from fourteen to twenty-one days.

In no other direction, perhaps, has modern surgery been more successful than in the treatment of appendicitis and typhlitis, for in the latter disease perforation of the appendix is one of the dangers to be greatly feared, a contingency easily avoided by a prompt and skillful use of the knife.

PERITONITIS.

(Inflammation of the Bowels.)

Peritonitis is inflammation of the peritoneum (the thin, smooth, serous membrane lining the abdominal cavity and covering the stomach, intestines, etc.). It is either acute or chronic, and is called local or general, accordingly as it affects a small portion of the membrane or spreads over the greater part or all of it. It is common to all ages of life, and sometimes seems to

occur spontaneously, but can usually be traced to some one of a large variety of causes, such as blood poisoning, or other morbid condition of the blood; an injury, as a wound, blow, or surgical operation; tuberculosis, abscess, appendicitis, typhoid fever, Bright's disease, cancer, disease of the heart, lungs or pleura, and perforations of the stomach or intestines; rupture is also a frequent cause.

Symptoms.—The attack is likely to be sudden, and the first symptom to be pain in a small part of the intestines, but soon spreading over every part of the bowels, and as the pain advances tenderness comes and increases more and more until the slightest touch and the movements of breathing are painful. The bowels become greatly puffed out with gas, and the patient, to relieve the abdomen from tension as well as to protect it from the weight of the bed clothes, lies upon his back with his knees drawn up.

There is vomiting, often of a deep green color, and a fever, with pulse sometimes reaching from 100 to 120 per minute in two or three hours after the beginning of the attack. The face is pale, haggard and anxious, the eyes sunken, the teeth set and lips tightly drawn, the expression of the whole face being one of extreme suffering. The disease usually runs its course in a few days, rarely in forty-eight hours, and sometimes lasts over a week. A case is recorded in which the patient recovered after forty-five days. Peritonitis is always very dangerous, but its termination depends largely upon the promptness with which correct treatment is begun, and the vigor and persistence with which it is conducted. When it follows perforations, tuberculosis or cancer, the case is almost hopeless.

Treatment.—The treatment must depend upon the cause, and, of course, be such as to allay inflammation as much as possible. Complete rest and abstinence from food are necessary throughout the entire disease. The patient should be put to bed and given neither food nor drink, his thirst being allayed by bits of ice, which are also valuable to suppress vomiting. All nourishment must be given by the rectum, either as suppositories or injections.

Cathartics of any kind should not be given. Dr. Alonzo Clark, who is an authority, says the bowels should be left entirely at rest until they recover their muscular tone, when they will expel

first the gas, then the feces, or if, after the inflammation has subsided, they do not move of their own accord, injections may be given; and adds that he has often left the bowels absolutely inactive in this disease for fourteen days without recognizable consequences. Generally, however, it is considered best by many to freely move the bowels at the beginning of the attack by means of an injection of water and soap, and then to give them absolute rest.

During the acute period of the disease a cold water or ice pack should be spread over the whole abdomen to arrest the inflammation, care being taken not to make it so large and heavy as to increase the discomfort of the patient. If cold water is used the cloths should be wrung from ice water and changed every ten or twelve minutes. Later, flannels wrung from hot water, or heated between folds of paper upon the stove, and liberally sprinkled with laudanum, should be applied instead of the cold ones. There is likely to be some doubt as to when the change from cold to hot applications should be made. Probably the feelings of the patient is the best guide, for in the acute stage the cold is usually well borne. Opium is the sovereign remedy in this disease. From five to ten drops of the tincture should be given every four hours as long as there is pain, but the use of opium should not be begun until a diagnosis has been made by the best physician within reach, for opium, by allaying the pain and tenderness, destroys the most characteristic symptoms of the disease so that it may then be impossible for even the most skillful to make out the true nature of the trouble until the effects of the opiate have worn away.

While recovery is taking place, the inflamed serous membranes sometimes become attached to each other, resulting in the folds of the bowels growing together, or growing to the walls of the abdomen, in such a way as to form strictures, or stoppages of the intestines, menacing health and even life. In some cases these adhesions can be broken up by hot and cold applications, using first one, then the other, changing every five minutes, and sometimes a surgical operation is the only resort.

As this is usually a result of some other disease, and a very important part of all treatment is removal of the cause, no minute rules can be laid down for the management of all cases of peritonitis. Often the cause is so hidden as to baffle the most skillful.

The best physician within reach should be called immediately, and the giving of opium postponed until after his examination, lest by its reduction of pain important symptoms be concealed. There are cases in which very large doses of calomel are advised by the best masters of the healing art.

CHAPTER II.

By R. E. McVEY, M.D.

TYPHOID FEVER.

Typhoid fever is a germinal disease, and occurs most frequently during the autumn months. The germ is supposed to enter the system through the alimentary canal. Cess pools, dirty stables, barnyards, or any place that has become saturated with fecal matter, piles of rotting manure, and most other accumulations of filth, are its favorite breeding places. It is probable that in by far the greatest number of cases it is taken into the system in drinking water that has become contaminated from some such source, but it may also be carried in milk that has been infected by dilution or from cans or other vessels that have been washed in impure water. In the same way fruits and other foods may become a medium of contagion. Oysters in beds near the mouths of sewers, or where sewage is deposited by polluted currents, sometimes become infected with typhoid, and have been known to transmit the disease to persons eating them raw. Thorough cooking would have destroyed the germs.

The alarming spread of this fever in our military camps during the late war was found by the board of investigation to have been due to an ignorant, if not criminal, disregard of simple sanitary rules. From feeding upon excrementitious matter in open latrines, swarms of house flies passed to the hard tack and other food of the troops, infecting it with millions of germs carried upon their rough, hairy little feet. Had all fecal matter been promptly and properly covered with fresh earth, and all water been kept pure, or thoroughly boiled before it was used in food or as drink, practically all of the dreadful scourge would have been avoided. In perfect health the acidity of the stomach is usually sufficient to destroy these germs, in which case they do no harm, but, entering when this organ is in a deranged condition, they pass through to their favorite fields, the Peyerian glands in the last section of the small intestine.

The first change wrought is in the blood; the second, in the spleen, which, by percussion, is found to be tender after the first chill, and later undergoes very marked changes, becoming enlarged and of diminished consistency. It continues to grow larger until the end of the third week, when it becomes soft like jelly, and is easily broken down, even by moderate pressure, and when removed from the body its cavities collapse.

The capillaries of the lungs are filled with blood, a condition liable to result in static pneumonia. Changes in the brain and nervous system are only inferential. The salivary glands may become hard like cartilage, which explains the lack of secretion or moisture in the mouth. Changes in the glandular structures of the stomach give rise to digestive disturbances.

The essential lesions of typhoid fever are found in the lymph structures of the intestine, the infiltrated cells being the lymphoid cells. Four or five glands, near the valve joining the smaller to the larger intestine, are involved. There is soon an abnormal accumulation of blood and catarrh of the mucous membrane, and there is also enlargement from increase of cells in the glandular tissue. These abnormal changes may terminate by absorption or by resolution. The most frequent way is through separation of the dead tissues by a slough, or by the formation of typhoid ulcers. In the fourth week cicatrization commences, gradually the swollen edges of the ulcers heal, and, springing up from their bottoms, connective tissue membrane is formed; the fever gradually subsides, and the patient slowly returns to health.

Symptoms.—The length of time from the entrance of the germ into the system until the first symptom is probably unknown. The first manifestations of the disease are so mild and gradual that it is often hard for the patient to tell exactly when the attack began. The symptoms most commonly noticed at the onset are frontal headache with giddiness and noises in the ears, general pains in the limbs and back, with feelings of lassitude and illness, restlessness and disturbed sleep, slight and irregular chills, diarrhea, loss of appetite, tongue furred with a thin whitish or yellowish coat, not extending to the tip and edges, which may be quite red, nausea and vomiting; but no disease presents more diversity at the beginning, and any of its symptoms may be either greatly exaggerated or wanting altogether.

Rarely at first, there is a moderate fullness from gas in the

bowels, with tenderness and a slight gurgling upon pressure in the right iliac fossa (the region in the right side of the abdomen in front of and near the upper part of the hip bone), but generally, and in the severer cases almost invariably, there will be some pain and tenderness in this spot by the sixth day, generally increasing as the disease advances, and in some cases becoming so great as to be unbearable, even if pressed slightly—a condition due to the ulceration of the Peyerian glands because of the poison generated within them by the typhoid germs. Sometimes there is much abdominal pain very early in the attack. In some cases diarrhea is the only prominent symptom for some days; in some, instead of diarrhea, there is constipation throughout the full course of the disease; and there are very rare cases in which there are no abdominal symptoms from first to last.

The tongue may be quite clean for several days, even when there is high fever, and, when coated with the thin whitish fur, it is usually small and moist, but it may be large and thickly coated, or red, smooth and glazed. There may be repeated bleedings at the nose. In a few days the fever begins to increase toward evening, and the temperature is soon found to be rising steadily from day to day, and from morning until evening and to decrease from evening until morning. This, in connection with several of the above symptoms, is a very strong indication of typhoid, especially if in four or five days the temperature is 103 or 104 degrees, but the other symptoms by themselves are not very positive signs, for they may be present in the early stages of other fevers, hence it may be impossible during the first few days to positively diagnose a case of typhoid fever.

It often happens that the patient does not feel sufficiently ill for some days to give up his occupation, thinking that there is not much the matter with himself, and sometimes a patient will walk during his entire illness. Although there may be some depression, the general appearance during the first week or ten days does not indicate any particular prostration; there is nothing peculiar in the expression, and the face is normal in color, or it may be pale, or a pinkish circumscribed flush may be seen on one or both cheeks, varying in depth of tint, but not constant. The skin is usually hot and dry, but is sometimes moist. The pulse is quickened to 100 or 120 per minute, is rather weak and soft, and varies in frequency in the same patient, is sometimes readily in-

creased, and generally is more rapid at night. The lips are parched and dry; the mouth feels slimy; there is thirst, loss of appetite, and, frequently, nausea and vomiting; there is enlargement of the spleen. The severity of the diarrhea varies greatly, the stools averaging from three to six per twenty-four hours, but sometimes as few as two, or as many as twenty, or even more. In a few days these discharges assume special characteristics, becoming thin, yellow (but sometimes brown, like coffee grounds), nearly fluid, and in appearance somewhat resembling pea-soup; very offensive, often ammoniacal and alkaline in their chemical reaction. When first passed they are uniform throughout, but, by standing, separate into an upper watery layer of brownish or yellowish color, and a lower layer or deposit, consisting principally of the remains of food, epithelium and mucus, corpuscles, blood and shreds of membrane. The urine is diminished and of high color. The sleep is restless and disturbed, but the mind at this stage is clear.

There is usually a specific eruption in typhoid fever that is very diagnostic, but in quite young patients and in those over thirty this is often wanting. In rare instances it appears as early as the fourth day, but is not usually seen until from the seventh to the twelfth day, sometimes not until the twentieth. It may appear upon the limbs, especially upon the thighs, and very rarely upon the face, but its usual locations are the abdomen, chest and back. The eruption consists of small papules of pin-head size or smaller, round, long, or oval in shape, slightly elevated, with rounded surface, of soft feel, and of a pink or rose color. They disappear upon pressure to reappear when the pressure is removed; they come in successive crops, each spot lasting from two to five days, then fading away, the number present at one time ranging from two or three to twenty or thirty; they may continue to come until the thirtieth day or longer, but the average time during which they appear is about fifteen days; they never become livid like flea-bites, and they are never present after death.

Some cases of typhoid are mild throughout their entire course, some are severe at first and mild later, some are mild first and severe later, and some are severe from first to last. If the tongue remains moist throughout the attack, and there is no marked prostration, nor severe nervous manifestations, the symptoms thus far described may continue without any particular change until the

patient begins to recover. But if the disease is more severe, as it passes into the second or third week, the tongue is likely to become more heavily furred, the coating becoming brown and dry, and foul matter will probably gather upon the teeth and lips, often forming crusts, which increase as the disease advances; but at any time during the attack the tongue may suddenly become clean and present a shiny, red appearance; the odor of the breath becomes very bad; the lips may become dry and crack, and a spreading eruption (*herpes labialis*) appear upon them. Sometimes the whole inside of the mouth becomes covered with dark colored incrustations, indicating blood changes and a very serious condition. While the tongue is thus heavily coated, the taste may be so impaired that the patient cannot distinguish between bitter and sweet. There is likely to be great thirst all through the attack.

As the disease progresses the patient emaciates and weakens—sometimes at the last being very much reduced; the face is more flushed; the whites of the eyes may become injected, the pupils dilated, and there may be inability to tolerate light. The headache is likely to be a dull, heavy pain, and to increase for the first week or ten days, or longer. There is pain in the back and limbs and throughout the whole body. From about the tenth to the fourteenth day the headache and general pains cease, and there is more giddiness and deafness. The hearing is nearly always impaired at this time and usually so much that it is difficult for the patient to hear ordinary conversation. About the second or third week the mind becomes affected, as shown by drowsiness, mental confusion, or delirium. For a time the delirium occurs only at night, but it may become continuous, though remaining worse at night. When it is of a low type the patient usually answers questions correctly, but he may sink into a condition in which he will lie with half closed eyes, appearing to understand what is said but unable to make intelligent replies. He may become noisy and violent, and may develop suicidal tendencies.

The abdominal symptoms continue and are likely to grow worse, and there is danger as long as the abdomen is distended with gas, no matter what the other indications may be. The formation of the gas is thought to be due to changes in the mucous membrane lining the intestine, and, although the process is not well understood, it is evident that as long as the gas continues to form

intestinal changes are still in progress. In all cases of typhoid fever with abdominal distention, perforation of the intestine is a disaster greatly to be feared, and this danger continues until the patient is nearly well.

The outlook is unfavorable in proportion to the height of temperature, and duration of the fever, especially if the morning remissions are but slight. Either a sudden rise or a rapid and extreme fall in temperature is a bad sign.

Hemorrhage of the bowels occurs in about five per cent of the cases, and may take place at any time after the tenth day, but is most frequent between the fourteenth and twenty-fourth days, and may be independent of any known cause. It may be very slight, in which case, as in bleeding from the nose, the blood comes from the capillaries of the mucous membrane and serves to show that the patient has a hemorrhagic tendency; or it may be very abundant, the patient sometimes discharging as much as eighteen ounces. In these cases the blood comes from an artery opened by an intestinal ulcer, and it may not immediately make its appearance externally; indeed a patient may die from intestinal hemorrhage before any blood is voided from the rectum. Such a hemorrhage is indicated by a sudden fall of two or three degrees in temperature, accompanied by extreme prostration. Unless death soon follows severe intestinal hemorrhage, peritonitis is very likely to set in. Even in the latent or "walking" form of typhoid fever, sudden death may occur either from perforation or intestinal hemorrhage.

In some cases there may be constipation throughout the entire illness, and in some diarrhea may not come until the third week, although the second week is the most usual time for its appearance. A mild diarrhea during the entire course of the disease is a favorable symptom. Many cases terminate about the twenty-first or twenty-eighth day; the average duration of fatal cases is said to be about twenty-two days, but death may occur within the first few days, and sometimes cases run seventy days or longer and terminate in recovery. The disease is especially severe upon those who have not become acclimated to the place in which they are while ill. The great majority of patients fully recover, but others are doomed to permanent ill-health thereafter, in some cases due to constrictions of the intestines, in some to the destruction of many of the villi of the digestive tract by the intestinal ulcers characteristic of the disease.

One of the first indications of recovery is a moistening of the tongue along its edges, which gradually extends over its entire surface. The temperature which in the evening may have been from 103 to 106 degrees, or even 107 or 108 degrees, declines very gradually, the first indication of which is seen in more distinct morning remissions. In three or four days the evening temperature falls, and the morning remissions considerably increase, so that a difference of two or three degrees, or more, occurs between the morning and the evening. The length of time until the evening temperature becomes normal differs greatly. Complications may lead to irregularities, and a relapse may cause the fever to rise in the same irregular manner as at first.

No part of the illness is attended by greater danger than that of convalescence. Of this the patient should be fully advised, and the nurse or attendant must constantly be very alert and firm. As the fever subsides the appetite increases until it becomes a controlling passion, so great is the craving of the tissues for food. Many a patient has lost his life at this stage by eating a banana, a little scraped apple, or some other longed-for and seemingly harmless article of food. As great care must also be taken in regard to exercise and exposure, until the patient is quite well. Visitors should not be admitted, and excitement of every kind should be avoided. Even so slight a strain as sitting up in bed too soon may prove serious. Through pumping poisoned blood so long, and having to draw its nourishment from it, the heart has become very weak and tender, and the patient must not add to its work, either by exercise or posture, until it can in some measure recover its old-time strength and tone, and he should then only very gradually resume such gentle activities as short walks and rides.

Typhoid is prone to relapses, and they may recur several times. There may be only a rise of temperature, but usually a relapse is attended by all the prominent symptoms of the first attack, except that everything is likely to be more condensed and last a shorter time. It may or may not be due to mistakes in diet or overexercise. It is probably caused by the involvement of one or more glands, which, until this time, had escaped. The claim that it is a result of reinfection has not been proved. It generally comes from seven to ten days after the temperature has become normal, but the interval may be longer than that,

and it may be much shorter, in some cases beginning before the evening fever has all gone. The fever rises more rapidly than it did at first, but in the same way, being lower in the morning and higher in the evening, and its duration is shorter in the relapse, seldom reaching fifteen days; its decline, too, is more abrupt, but it may run higher than it did in the first attack. The eruption returns, often on the third day, the spleen enlarges again, the discharges from the bowels may or may not resume the liquid form, and all kinds of complications are liable to arise, but the consequences of a relapse are not usually as dangerous as supposed, and, with proper care and nursing, the patient generally recovers.

Malaria may appear at any time, hence is one of the complications to be guarded against. Many cases of so-called remittent, bilious or malarial fever are modified typhoid. It should be remembered, too, that malarial fever and typhoid fever are no protection against each other; on the contrary, either may predispose to the other by reducing the system until it is less capable of resisting disease.

Treatment.—The first factor in treatment is the proper nourishment of the patient; the second is the control of his temperature without debilitating him. For the latter purpose, one drop of the tincture of aconite with one-sixteenth of a grain of morphia may be given every two hours, or at such longer intervals as may be required to keep the temperature below 103 degrees. Also give the patient quiet rest. As already stated, a positive diagnosis of typhoid fever cannot always be made until about the fifth day.

The abortive treatment consists of calomel, iodine and the mineral acids. Three grains of calomel, twelve grains of the bicarbonate of soda and twelve grains of the sugar of milk should be mixed, divided into twelve powders, and one given every hour. Calomel is a germicide, but its chief value probably lies in its stimulation of the biliary functions of the liver, for bile is the greatest antiseptic known for the prevention of decomposition in the alimentary canal. The calomel should be given only in small doses and continued only five days, after which give sulpho-carbolate of zinc every three hours. The calomel treatment in much larger doses was thoroughly tried in the army during the war of the Great Rebellion, but the mortality was over sixty per cent.

In Germany the treatment, as given by Leibermeister, is one dram of the tincture of iodine, and three drams of the iodide of potassium, with one ounce of water; dose, three drops in a wine-glass of water every two hours.

In this country the "carbolic acid treatment" has been used instead. It consists of one dram of carbolic acid, one dram of the tincture of iodine, and two drams of glycerin, mixed together, and doses of four drops each given every four hours; but, although it has many advocates, its success has not by any means been an unqualified one, and the same is true of every combination of antiseptics yet devised. No agent has been found by which typhoid germs in a human intestine can be dislodged or overcome without killing the patient, but the work of these parasites is self-limited, and when their race is run, and only then, the reparative energies of the system can be relied upon to effect the cure. The process cannot be hastened. Upon the vitality of the patient must depend the success of the final effort; hence, if the calomel treatment of the first five days proves unavailing, and the fever becomes well established, instead of trying to abort it with powerful medicines, give only such remedies as are needed to ward off complications, control the bowels, temperature, pulse and nerves, and, by careful feeding and nursing, keep up the strength until the diseased glands shall heal.

To lubricate or coat over the intestines and soothe the ulcerated glands, as well as to check excessive bowel movement, nothing is better or safer than bismuth; and to stimulate the liver, and quiet the nerves, Dover's powder is excellent. The two are best given together—five grains of the subnitrate of bismuth with two or three grains of the Dover's, once in three or four hours. Should constipation set in, the quantity of bismuth may be diminished. It is so important in this disease to keep the bowels quiet, it is better not to give laxatives as long as there is a passage once in two days, but should a longer time intervene (and a good movement cannot be obtained by means of a rectal injection), a mild cathartic must be given. A small dose of castor oil is best, repeated every four hours until action is obtained. All severe cathartics must be carefully avoided, since, by causing violent peristalsis, they might do great harm by irritating the intestinal ulcers and increasing inflammation. It is well for the patient to spend two-thirds of his time in sleep, but if there is too much stupor, less Dover's should

be given, the quantity to be diminished as the case requires. In such cases it will usually be best left off in the morning and given at night.

When the temperature rises above 103 degrees, it should be reduced by sponging with water as warm as can be borne. Dr. Curry advocated the use of cold water, as the greatest of antipyretics, for the reduction of temperature, and many have followed his theory; but I get better results from the use of warm water. The temperature should be lowered by evaporation, not by the application of cold, which may drive the blood from the surface, to the great central vessels, engorge them, and throw excessive work upon the heart, already overtasked and in a feeble condition. There is danger of heart failure. Everything that excites, shocks or weakens should be studiously avoided. Warm water, with its consequent evaporation, controls temperature quite as well as cold water, without the risks from depression. It is safer, too, to apply it with a sponge than to put the patient into it. Keep him as quiet as possible, and out of cold draughts. Sponge first the face, then the hands and arms, next the trunk and lower limbs, repeating the process every fifteen to thirty minutes until the temperature yields, but do not expect to reduce it more than two, or, in some cases, possibly three degrees.

The patient should drink freely of cold water; give him all he wants, for it will lower temperature as well as quench his thirst, and by stimulating the kidneys, help in the elimination of poisons.

When the pulse rises above 105 beats per minute give from one-sixtieth to one-thirtieth of a grain of the sulphate of strychnia every four to six hours, until the rate is reduced. It is kept ready prepared in tablet form at the drug stores, and is one of the best heart tonics known.

Quinine during the early part of the attack is of very little service in typhoid, but, in the later stages, it has antipyretic value, wards off malaria, and serves as an excellent tonic. It may be given in from two to four grain doses, every two to six hours; or it may alternate with the strychnia, or may be given in the forenoon only, the Dover's powder being given instead in the afternoon and at night.

In case there is any distention of the abdomen with gas, or much abdominal pain, liberally sprinkle a soft woollen cloth with turpentine, spread it over the abdomen and leave it there until

the skin is well reddened, but not long enough to cause a blister, then remove it and in its place apply a similar cloth without the turpentine. This may be repeated at intervals of eight or ten hours as the case may require. Do not apply warm or hot cloths or poultices to the abdomen in treating this disease.

Should the limbs and feet become lame with a soreness akin to rheumatism, they can usually be much relieved by gentle massage. If the back and hips become inflamed, bathe them each day with alcohol to prevent bed sores.

While the fever lasts the diet must consist of fluids, and, during the return to health, the restoration of solid foods must be very gradual. Milk is the proper food, and, in cases where it agrees, should be the only food. It is of the greatest importance that the strength be sustained as well as possible, and to do this the milk must be given with careful regularity, not oftener than once in three hours, and in as large quantity as the patient can digest. If curds appear in the stools, the quantity must be diminished until the right measure is found, after which this amount must be given steadily. If its casein disagrees with the patient, the milk should be modified by adding barley water, lime water, or some other diluent. Sometimes milk from a different cow is what is needed. Should the milk continue to disagree, nothing is better as a substitute than beef tea, or will do more to keep up the strength; give from two to five teaspoonfuls every two hours. For its preparation see "Nursing."

When the fever has gone, and solid, easily digestible foods are gradually restored, maltine with pepsin and pancreatin should be given, a teaspoonful after each meal; or five drops of nitro-hydrochloric acid may be given instead. Let it not be forgotten that there is now great danger from overfeeding and overexercise, and that until the patient is quite well his condition is always critical. In some cases the hydrochloric acid increases the hunger so much that it should not be given.

The sick-room should be removed as far as practicable from the family living rooms, should have an abundance of sunlight, and its air must be kept pure by good ventilation. All milk and water used by the family, unless the supply be hydrant water, known to be pure, should be boiled. As the spreading of the disease is wholly from the excreta, all discharges from the patient should be thoroughly disinfected (see "Disinfection and Disin-

fectants"), and buried at a safe distance from cisterns and wells. As an additional precaution, it is wise to drop a five-grain bi-chloride of mercury tablet into the chamber after each cleansing, and add a pint of water.

MALARIAL FEVER.

Malarial fever is a disease caused by the development and multiplication in the blood of a germ called *plasmodium malaria*. There are three types or forms of the parasite, and they do their mischief by destroying the red-blood corpuscles. As they are exceedingly minute, and can be detected only by a skillful microscopist with the aid of a good instrument, we will not describe the various forms nor enumerate the differences which distinguish each from the others; we will, however, observe that the form called the tertian lives forty-eight hours; that another, the quartan, has a life-cycle of seventy-two hours; and that the aestivo-autumnal is thought to live but about twenty-four hours, but, as with all other living creatures, their lives may be shortened or lengthened by external conditions. Their natural life-cycle terminates in segmentation—the process by which each germ breaks up or separates into from six to twenty segments, whereupon, by bursting the membrane of the containing corpuscle and escaping into the blood, each of these parts attacks a fresh red-blood cell, in which to live and develop into a mature organism like the parent from which it came.

The paroxysm (the chill and the fever), which in this disease is always intermittent, appears to follow the act of segmentation so closely that, in the tertian and quartan forms, they occur at nearly the same hour every day, or every second or third day, accordingly as the patient has been infected with one or more than one crop of the same or different forms of the parasite. The aestivo-autumnal type differs from the others also in being less regular in its development in crops, in being smaller, and in its more rapid destruction of blood cells. It is often the cause of the irregular malarial fever seen in the fall of the year, and is destroyed by quinine less readily than the other forms. Koch has proven this form to be identically the same as tropical malaria.

It is thought that all three forms get their food entirely from the blood, and probably from the red-blood corpuscles. As each young germ makes its abode in a red-blood cell, feeding, maturing

and segmenting there, each crop or brood destroys a very great number of cells, and it has often been found that after a paroxysm from ten to fifty per cent of the normal proportion of these red cells are wanting, and that their coloring matter has been left as refuse in the blood.

How the first germs get into the blood is not certainly known, but it is probable that, in by far the greatest number of cases, they enter the body with the drinking water. Strong proof of this is found in the following facts, which have been widely quoted: "At Brownsville, Texas, is a military post, which takes its water from the Rio Grande. It is surrounded by what have long been considered most typical malarial conditions, such as swamps and stagnant lagoons. Until 1890 the hospital record of this post was by far the worst of any in this country in the proportion of its malarial diseases. The medical report for that year shows that its hospital admissions of malarial cases were 1,876 for each 1,000 men stationed there, and this was the usual proportion. The next year an ice plant and condensing apparatus for supplying distilled water were put in at this post, and so great were the advantages derived from the pure water that it was immediately furnished, for all drinking and culinary purposes, to the entire command. In the following year the number of admissions for malarial diseases were but sixteen for each 1,000 men, or less than one per cent of what the regular number had been from the first establishment of the post. There had been no change in anything except the drinking water. The swamps and lagoons were still there, and the unhealthy city of Brownsville, in which impure water was still used, remained on their borders, and the few cases of malaria that still entered the hospital may have been caused by soldiers drinking water when away from the post. This would seem, therefore, to prove that the malarial troubles were wholly due to impure drinking water, and not at all to the air that was breathed, and that malarial diseases are produced by water-borne germs."*

It is believed by Professor Koch of Berlin and many other careful investigators, that the infection is also disseminated by mosquitoes—these agents playing much the same part in malaria that is played by ticks in the cattle disease, known as "Texas fever." Human blood, known to be pure before being absorbed by them, has been found, a little later, abundantly impregnated

*Address of Prof. J. B. Johnson before the Kansas State Board of Health.

with malaria germs, thus proving that the mosquito sometimes carries them within its body, and it is probable that it may also occasionally carry them upon its bill from the contaminated pools at which it drinks.

A strong, vigorous person, through the natural resistance of his system—perhaps by the acidity of a healthy stomach, perhaps by an antitoxine formed in the blood for that purpose—is able to overcome the few germs which ordinarily effect an entrance, but, coming when the blood is reduced or the stomach is disordered, as from disease, fasting, fatigue, dissipation, or the effects of heat or cold, or coming in large numbers for a long time, as from repeatedly drinking infected water, the natural resistance is finally overpowered, and malarial fever results.

Symptoms.—The first symptom is depression of the brain and nervous system. Soon there is a yellow, jaundiced appearance in the eyes and skin, caused by the coloring matter of the destroyed blood cells, which is also carried to the liver, spleen and other organs. The temperature begins to rise before the chill begins, and usually reaches its highest point while the chill is on. There is an increased amount of urine and changes in its composition which give it a clear, watery appearance. This occurs about two hours before the chill. There is more or less nervous disturbance, and as the disease progresses there is constriction of the surface vessels, which drives the blood to the central organs and engorges them. This is the period of chill, and it lasts from thirty minutes to half an hour, when reaction comes. The surface vessels now dilate and become over-filled with blood. This is the fever stage. Finally these distended vessels are relieved through sweating. There are three stages to each attack—the chill, fever and sweat. An interval follows during which the patient feels that he is well, its length depending, as we have seen, upon the form of the germs and the number of crops with which he is infected.

Treatment.—To relieve the liver, spleen and other organs, use the following: Calomel, three grains; bicarbonate of soda, twelve grains, and sugar of milk, twelve grains; mix and divide into twelve powders, then give one every hour until the bowels move freely. Both as a germicide and as a support to the nervous system, quinine is the remedy. It should be taken in three-grain doses in coffee, capsules, or lozenges, the hard coated pills not being as good. Children take it best in yerba santa. This treatment should

be continued until all the symptoms have subsided. To do its best work the quinine should be given six hours before the chill, or during the sweating. If there be great pain, or an accompanying diarrhea, mix with the quinine from one-sixteenth to one-eighth of a grain of morphia. If, when the urine first begins to increase, we give one-fourth of a grain of pilocarpine, we will anticipate and prevent the recurrence of the chill and fever, and tide the patient over to the sweating stage.

As already shown, malaria can be very largely prevented by properly observing the laws of its development and dissemination. Except distillation, boiling is the best method of freeing water from all bacterial germs, and in a malarious country, especially in its most malarious seasons, all the water used for drinking and culinary purposes should first be boiled. Malaria is most prevalent where there is most decaying vegetable matter, and this occurs not at times of greatest rainfall, but when the wet earth and low lands are drying out; and the danger reaches its height during drouths after very wet seasons. Draining millponds and lakes is attended with danger while their bottoms are drying up, but having been thoroughly dried and cultivated with crops they become healthful. On the other hand malarious swamps have been robbed of their terrors by flooding to a depth sufficient to keep them covered with water.

Again the amount of malaria in a region appears to be indirectly proportional to the amount of plant growth going on there at the same time, a condition to be expected if we remember that the poison consists of germs whose development is retarded by the excessive moisture, prevailing during the periods of most rapid growth.

While water is indisputably the principal medium for disseminating the infection, it has not been ascertained that the germs may not be borne in the air to the lips and thence carried to the stomach in saliva, or that they may not enter the blood through the lungs, hence, the old safeguards against miasmatic air should not be discarded, even though of less importance than formerly supposed. In brief, they were as follows: Winds blowing from off swamps, marshes and low lands impregnated with decomposing matter are laden with malarial germs, so in choosing a home let it not be in these currents, but where the prevailing winds will blow toward the pestilential centers, rather than from them. It

is not usually thought that the poison is thus carried far, but in high winds it may be borne a considerable distance. Forests interpose a barrier and orchards and groves afford valuable protection. Plant them about the home, especially on the sides from which malaria is most likely to come, using care not to shade the house itself much; and cultivate and crop the surrounding land, especially all neighboring low land. Grass is far less dangerous than growths of weeds.

As the germs are more numerous near the ground than a little above it, sleep upstairs. Because of the destructive influence of sunlight upon germs, malaria is not as intense during the day as at night, hence in malarial regions avoid exposure to night air. If you must be out at night, or in the dews and fogs of early morning, wear flannel next the skin, and dress warmly, for taking cold predisposes to this disease. Chilling is one of the most dangerous of all the predisposing influences—so reducing systemic resistance that it may be unable to longer overcome malarial germs. See to it that children are properly covered during the cool part of the night and early morning. The same is true of the condition produced by long fasting, so guard against exposure before breakfast; fortify the system by taking a drink of hot coffee before beginning outdoor work in the early morning. Its preventive power against malaria is considered great. On damp mornings in summer a little fire in the living rooms is a wise precaution.

Lime is thought to destroy malaria, if applied fresh and in considerable quantities. It should be freely spread upon freshly upturned earth in cities, as when grades are being changed, or trenches dug for pipes, sewers, etc., for such ground is usually full of malaria. Smoke and fumes from burning sulphur, petroleum refineries, lime-kilns and gas works are also said to be preventives.

If much exposed to malaria, quinine is the surest and best antidote. Many recommend it in two-grain doses morning and evening, when forced to remain in very malarious regions, such as abound in low, tropical countries; but in the temperate zones it is better to use it only in case of attack, since the changes in the system, resulting from constant absorption of the drug, may prove more serious than the disease itself.

INFLUENZA.

(La Grippe. Grip.)

Influenza is a specific, highly infectious fever, characterized by nervous symptoms and great debility, and often accompanied by catarrhal inflammation of the respiratory and digestive organs. It was mentioned by Homer, who wrote about 800 B. C., and is known to have been epidemic in Ireland in the fourteenth century. Starting from Malta in 1510, it quickly swept over all Europe, "scarcely missing an individual," and it has been widely epidemic there nearly a hundred times since.

It has been common to all ages and altitudes, climates and countries, hot and cold, wet and dry, regardless of surroundings, and nothing can better prove the definite character of the disease than the similarity of the symptoms it has shown through all these centuries amid the most widely differing circumstances and environments, and although the improved hygienic conditions of the present may have reduced the amount of mortality, they do not appear to have influenced the diffusion of the epidemic.

It has many names, as lightning catarrh, epidemic bronchitis, and epidemic catarrhal fever. The French term, "*la grippe*," is widely used and means to seize, so suddenly does it lay hold of its victims. The English word "*grip*" is quite as proper. It is due to a short-lived germ, which secretes a poison of very great virulence, for in this, as in most other infectious diseases, it is not the number of parasites that circulate in the blood, but the virulence of the poison they produce that measures their capacity for injury. No other malady is attended by a greater variety of severe symptoms, or followed by more sequels of a serious nature, leading a little later to loss of health, if not to death; and it should be understood that while grip often lasts only two or three days, and in some cases the patient hardly knows that he is ill, to the infirm, the aged and the predisposed it is a very dangerous disease.

In uncomplicated cases death rarely results, but there are few disorders of the nervous system that are not liable to occur, either as its accompaniments or consequents. It was long considered a catarrhal affection, and there is much about it that is not yet understood, but the most careful investigators now regard it as a nervous fever, caused by a poisoning of definite nerve centers by the toxine produced by the micro-organisms, the parts affected

in each case depending upon the center that is attacked, the seriousness of the disease, upon the power of resistance possessed by the patient. Catarrhal inflammations may or may not be present. They are often very important features, but in nearly twice as many cases the nervous symptoms predominate, and there have been frequent cases of grip in which the patients neither coughed nor sneezed.

The period of incubation varies greatly; as in some cases the symptoms come on immediately after exposure, while in others they do not appear until several days after. One attack does not confer immunity, and a patient may suffer two attacks during one epidemic.

Symptoms.—A sharp, short attack of fever; great physical and mental prostration; severe pain in the head, body and limbs; often pain in the eyeballs, much increased upon motion; a sense of fullness across the forehead; sleeplessness, sometimes delirium, convulsions, coma, paralysis, deafness and loss of smell and taste. Tonsilitis, bronchitis, croup, heart complications, catarrh of the mucous membranes or pneumonia may follow. The fever attack is usually very sudden, the temperature soon reaching 100 degrees to 103 degrees. Althaus reports a case in which the temperature was 109 degrees for three days, then soon subsided and the patient recovered; and adds: "There is no correspondence between the degree of heat and the severity of the illness, as in the eruptive fevers, and in other acute diseases."

In uncomplicated cases, in otherwise healthy people, the fever rarely lasts longer than one, two or three days, and the symptoms often leave as suddenly as they came. Those cases do best in which high fever is followed by perspiration and loss of heat. When the fever lasts more than two or three days it is due to unfavorable complications, or to the age, weakness or pre-existing diseases of the patient.

Grip is likely to engraft itself upon the remnants of any old disorder still lurking in the system, and rouse it to greater virulence than it ever before displayed; thus heart disease may be suddenly increased to such dangerous proportions that even a little change of position, or slight effort of any kind, may prove fatal; syphilitic poisoning of long standing and sluggish form may be roused to uncontrollable activity; and alcoholism be speedily advanced to delirium tremens of more persistent type than is ever shown when caused by alcohol alone.

Grip is not as common in children as in adults, but they are by no means exempt. It often begins its attacks upon them with intense headache, vomiting, constipation, grinding of the teeth, stiff neck, delirium, convulsions and coma. Sometimes unconsciousness comes so suddenly as to resemble apoplexy, and the alarming features then subside in a day or two.

In the nervous form, headache, next to fever, is the most characteristic feature. It is often associated with backache of very severe type, especially in the loins. There is also liable to be soreness and stiffness of the whole body and great pain in the limbs, causing tremors, twitches and cramps.

Treatment.—Many cases are so mild as to need no treatment, other than light diet and precautions against taking cold. In the severer attacks first give the following:

Hyoscyamus extract	fifteen grains
Quinine	one-half dram
Camphor	one-half dram
Socratine aloes	five grains

Mix and put in thirty capsules, then give one every four hours until relief is obtained. The patient should take a hot foot-bath, lasting ten or fifteen minutes, kept as warm as can be borne by adding more hot water from time to time; then drink copiously of hot lemonade and be covered up warmly in bed.

As great depression attends this disease it is very important to keep up the strength of the patient as much as possible; hence debilitating remedies of every kind should be avoided. Bronchial congestion and sore throat may be greatly relieved by the inhalation of steam. (See acute sore throat.) Should pneumonia develop, give five-grain doses of carbonate of ammonia in a teaspoonful of yerba santa every four hours. It must be remembered in all such cases that poison in the blood is the primary trouble and that it will admit of no depressing remedies. As much as possible avoid weakening the patient. The bronchitis and pneumonia are secondary affections, and their suppression will soon follow the use of supporting measures. In such cases, besides the other treatment, give four ounces of yerba santa maltine, such as is kept at the drugstores, in one teaspoonful doses three times a day; or an ounce of good wine three times a day with meals.

If taken in the beginning, from three to five grain doses of quinine three times a day may terminate the attack. In cases of slow recovery the elixir of iron, quinine and strychnia, found ready prepared at drugstores, in teaspoonful doses three times a day after meals, will restore strength and vitality.

The patient should guard carefully against taking cold, and not resume work too soon, for very often when in a fair way to recovery a little imprudence leads to relapse, or challenges a train of ills, when, because of its depressed condition, the system is not able to cope with any one of them. The aged and infirm should remain housed in well warmed rooms during an epidemic of grip, and take a nourishing diet; for the healthy and well fed are best prepared to resist the disease.

DIPHTHERIA. MEMBRANOUS CROUP.

Diphtheria means membrane. It is a fungous disease, wholly due to a specific germ, the Klebs-Löffler bacillus, a microscopic plant so minute that the shell of a mustard seed would hold ten millions of them. Just as the growth of wheat, corn, or any other form of larger plant-life, is subject to certain laws, so the dissemination, growth and multiplication of these little plants, these deadly disease germs, are controlled by certain conditions; if these conditions be unfavorable the germs will cease to multiply; if very unfavorable, they will die. It is now thought that, except in warm milk and when artificially cultivated, they never grow and multiply outside an animal body, and it is known that although they may live in the human throat at any time from infancy to old age, they grow fastest and flourish best in the throats of children from two to ten years old. Why this is so no one can tell, but it is known that it is so.

Dr. Charles T. McClintock, of Detroit, says: "As larger plants, under unfavorable conditions, may barely keep alive, without increasing or spreading to adjoining soil, so it has been shown that diphtheria germs may at times live in the throat of an adult, but merely live and not multiply, because of the unfavorable conditions, and the individual, therefore, not have the disease, diphtheria.

"The germs grow best at about the temperature of the human body—94.4 degrees Fahrenheit. They cease to multiply when the temperature falls to 68 degrees, and this is one of the reasons they

do not multiply in sewage. They also cease to grow when the temperature is raised a few degrees higher than that of the body and are killed at a heat of 136 degrees to 140 degrees. The germs grow only where there is moisture. They may remain alive but do not multiply in dried sputum, in dust, on dry clothing, etc. Dried on cloth they may live for one or two months, and there are instances of apparent infection from rooms, clothing and bedding which seem to show that the germ in a dry state may live for months, possibly years. Like other particles of dust, the germs cling to a moist surface. Neither they, nor any other disease germs, are to be found in the breath of the patient, so, though they be emptied by millions into the sewers, they do not, cannot rise with the sewer gas. In coughing and gagging, the patient will throw out particles of saliva and of the diphtheritic membrane. These may contain thousands of the germs. Many a physician has paid with his life for his care in examining and treating the throat of a diphtheria patient, the coughed-out particle striking his eye, nostril or mouth, giving him the disease. Contrary to the conditions obtained in higher plants, sunlight is fatal to these, as to all disease germs—even the most resistant of them being killed by a few hours' exposure to the direct rays of the sun. The lesson to be learned from this is obvious, yet, through fear of faded carpets, we shut out the best of all disinfecting agents."

It is probable that an unsound throat, or a debilitated condition, even in an adult, facilitates the development of diphtheritic germs, but that vigorous health prevents them from increasing to numbers capable of working any injury, unless it be by finding their way, as through a public drinking-cup, kissing, or some other medium of transmission, to the throat of a more susceptible person. The custom in our schools of using books and pencils furnished at public expense and indiscriminately passed from one child to another, cannot be too strongly condemned, for even though the pupils may be instructed never to touch them to their lips, they must ever be a source of constant danger.

The quantity of these germs present in any case bears a close relation to the intensity of the disease. As they multiply it advances, and as they diminish it subsides. They are divided into two classes—the *aërobic* and the *anaërobic*. The first class live where they can get air, and cover the membranes of the throat as grass covers a lawn. The second class burrow in the tissues and

live without air. These two kinds of fungous growths, and the exudation they produce, make up the membrane of diphtheria.

In simple inflammations of the throat there are always present certain forms of germs which, in case diphtheria sets in, are displaced by the diphtheritic germs, which are the stronger and more virulent. In this way we account for a simple sore throat sometimes suddenly changing into a diphtheritic one, and, for this reason, when diphtheria is prevalent, a sore throat should be carefully watched from day to day. If an exudation appears it is evidence of the presence of diphtheria.

Symptoms.—The symptoms of typical diphtheria are quick pulse, fever, white streaks on the tonsils, scant high-colored urine, thin white coating of the tongue, and loss of appetite, accompanied by more or less nervous prostration. In grave cases the pulse is 120, the temperature from 100 degrees to 103 degrees, the breath is fetid and there is likely to be vomiting. Albumin appears in the urine about the third or fourth day, and about the same time the exudation appears in the throat and extends from the pharynx up into the nasal cavities, forming into a thick, leathery membrane. The glands at the angles of the jaws and under the chin become swollen, their connective tissues having become infiltrated with the diphtheritic virus, which has also been carried throughout the whole system. This poison, produced by the growth of diphtheritic germs, has been demonstrated to be analogous to that of certain venomous serpents.

For four or five days after the formation of the membrane it does not seem to change much, then it loosens at its edges and rolls up toward the center, where it finally also loosens and becomes free, the parts beneath being left bare and covered with red points. If the patient is to recover no new membrane forms, but if his vitality is greatly reduced this cast-off membrane is replaced by another which may be more extensive than the first, project into the larynx, and even into the trachea, diminishing the supply of air and endangering the patient's life.

Treatment.—The treatment should begin with two grains of calomel in a tablespoonful of water, mixed with nothing else, and swallowed slowly, that it may lodge in the throat and act as a germicide. This should be repeated every two hours until the bowels move freely. Instead of this, some prefer to use the bichloride of mercury, one-fourth of a grain to four ounces of

water, giving a teaspoonful of the mixture every four hours. While giving this, all discharges from the bowels should be carefully examined, and if any green color appears in the dejections the medicine must be stopped immediately, or changed, lest mercurial poisoning follow.

Pilocarpine in very small doses, one one-hundredth of a grain, may be given to prevent the attachment of the membrane upon the surface of the throat, by the intervention of mucus, the flow of which is greatly stimulated by this drug. If the patient becomes weak he may be given two grains of quinine every two hours until the strength is restored. In case of marked depression alcoholic stimulants may be used.

Do not try to remove the membrane by tearing it off, for the raw place thus caused will surely be covered by another membrane. A most valuable agent for hastening its removal is peroxide of hydrogen. It should be sprayed into the throat with an atomizer every twenty minutes for three times. The following mixture should then be used: Oil of sweet almonds one ounce, oil of eucalyptus five drops, and menthol from five to fifteen grains; spray it into the throat once an hour, or as often as the throat becomes dry and painful. Inhaling steam from water, or from water and cider vinegar, as hot as can be taken, by means of a rubber tube attached to the spout of a teakettle, is good to afford temporary relief, but, aside from this, is of little value, and, if long used, or often repeated, is liable to do harm. Never use poultices in treating this disease.

In some cases where the diphtheritic membrane is large the patient can be saved from smothering by intubation, which consists of inserting a silver tube, designed for the purpose, into the throat and leaving it there until the membrane loosens and can be removed. Sometimes this fails because of the formation of another membrane in the trachea below the end of the tube, but the device has saved many lives.

The Antitoxin Treatment.—There has been a wide difference of opinion among physicians as to the value of antitoxin, but the treatment seems to have promptly reduced the death rate of this disease in Parisian hospitals to one-half that prevailing before its introduction there, and about the same reduction through its use is reported in Germany, but, if statistics can be relied upon, far more beneficent results have been obtained in this country.

"Prior to the introduction of antitoxin, the mortality rate in Chicago was about 35 per cent, and in the first twenty-six months of its use by the health department of that city the rate was reduced to 6.77 per cent, but the results recorded for November last are nothing short of marvelous. During that month 163 cases were reported and investigated, 98 of which were found to be true diphtheria, and were treated with antitoxin. In addition there were four cases remaining from the previous month, so that in all 102 cases were treated, from which there were 97 recoveries, 3 deaths, and 2 remaining under treatment at the end of the month, making the extremely low death rate of 3 per cent. These facts should remove any remaining scruples which may exist against this treatment."—*Med. Record*.

Diphtheria antitoxin is the serum of an animal's blood, usually that of a horse or goat, rendered immune by a large number of inoculations with diphtheritic virus. The following is substantially the process, as given by E. Roux of Paris: A healthy horse is given at first a hypodermic injection of $15\frac{1}{2}$ drops of strong diphtheritic virus prepared by culture. As soon as the resulting fever subsides he is again inoculated, but with a larger amount.

This is repeated again and again, the amount injected being each time increased. At the end of the first month from twenty to thirty times as much virus is used as at first, without increasing the symptoms. The inoculations are thus continued a great many times until very large amounts of the most virulent diphtheritic poison can be injected directly into his veins without causing more than a fleeting rise of temperature. This requires from three months to two years, and the horse is then said to be immune and the serum of his blood is ready for the treatment of patients.

It is usually injected under the skin of the thigh, and the average amount used at first is about one one-thousandth the weight of the patient.

It is expected that within twenty-four hours after the injection the diphtheritic membrane will cease to form and that it will become detached from the throat in from thirty-six to seventy-two hours. Intubation is the complement of the treatment, enabling the patient to breathe until the membrane can be removed.

Diphtheritic germs are often found in the throat of a patient many days after all signs of the disease have disappeared, hence he should remain in quarantine until from-examination he has been

found free from the contagion. Each day his sputa and the soiled cloths used about him should be burned and all his dejections disinfected.

As a preventive measure in suspected cases of diphtheria, the throat should be dusted twice a day for three days with equal parts of quinine and flour sulphur. In a small glass tube, six inches or more in length, place the mixed powder, then blow it into the throat, using the precaution of placing the tube in boiling water immediately afterward.

Having had diphtheria is no protection against having it again, on the contrary it seems to predispose the patient and render him more liable to the disease. Recurrences sometimes are separated only by short intervals, and there is considerable danger in placing patients that are convalescent from it in close contact with new cases of the same disease.

MEMBRANOUS CROUP.

Except in degree of severity there is no difference between membranous croup and diphtheria. Both are caused by the same germ, but croupous inflammation involves only the superficial or epithelial layer of the mucous membrane of the throat and is comparatively mild, while diphtheria extends to the deeper layers of the membrane and is the severe form of the disease. The treatment is identically the same for both.

VARIOLA.

(Small-pox.)

Small-pox is such an old disease that its original habitat is uncertain, but it is known to have been epidemic in China many centuries before Christ, and that it was introduced into America by the Spaniards shortly after the discovery of the New World.

The germ to which it is due has not been found, but the virus, or poison, produced by it is of such virulence as to make small-pox the most infectious, malignant and fatal of all diseases. It is supposed that it usually makes its entrance into the system by way of the lungs, being inhaled with the breath. It is also contagious, but in this case the virus must reach the blood through a wound, for contact alone is not enough. The eruptive matter, though taken fresh from a small-pox pustule and reeking with the septic poison, will not convey the disease by being merely smeared upon the unbroken skin.

The disease, when introduced through a wound or abrasion, has the singular property of running its entire course with less than a hundredth part of the malignancy and danger that accompanies it when, as infection, it is taken into the system through the breath—a phenomenon which has never been explained, but of which practical advantage has been taken in India and China for many centuries, and from which countries the system now known as inoculation spread to other lands and became almost universally employed by all civilized nations.

As people of both sexes and all ages of every race and climate are subject to this disease, rarely failing to take it at the first exposure, and as it was usually fatal in one-third of all the cases contracted through infection, and of the other two-thirds a very large proportion were disfigured, maimed or disabled for life; and as it is variously estimated that only one case in every three hundred to ten hundred cases from inoculation is fatal, and the disease from this source is as sure to cause immunity from further attacks, as an attack brought on by infection, it is at once seen that the value of this discovery was beyond comprehension.

Authorities differ as to the time at which a small-pox patient will first give the disease, some affirming that this danger is not reached until the eruption begins, while others maintain that the poison constituting the infection exists in the breath and exhalations of the body, as well as in the eruptive matter of the pustules, that the danger commences even before the first symptoms appear, reaches its height during the period of desiccation (drying of scabs), and continues until sometime after the eruption disappears.

There is also a wide difference of views as to the distance to which the infection may extend, some claiming that it may be disseminated over a whole city, others denying that there is any danger further than from three to six feet from the patient, if he be in the open air. Both of these theories may contain some grains of truth, for the distance must vary greatly in different stages of the attack. As drying does not destroy the germs, the dried scales, as a dust-like powder, are the most-to-be-dreaded medium of spreading the disease, for the germs upon them, retaining their virulence indefinitely, may settle upon everything in the room or be borne considerable distances by favoring breezes. Of course, they may also be carried in clothing hundreds of miles, and there is always very great danger from clothing and bedding used by

patients with this disease. If laid away it may continue to be a menace for many years. Open air and bright sunshine, especially the latter, are good disinfectants and exposure to them greatly diminishes the danger, but the only safe way is to immediately burn all clothing and furnishings used about the patient as soon as he recovers.

The mildest case of small-pox may impart the disease in the most malignant form, for the degree of severity depends upon the constitutional condition of the patient. Although one attack usually confers immunity there have been a few people who have had a second attack, and a very few who have had small-pox for even the fifth or sixth time, and, strangely enough, the last attack, in some cases, was severer than the first. On the other hand, there is said to be, once in a great while, a person who is insusceptible to the disease and does not take it, no matter how often exposed.

The dark-skinned races, especially the negro and Indian, suffer most from small-pox, whole tribes of the latter having been swept out of existence by it in a few months, but the Mexicans seem to be an exception to this rule, for, although the disease is very common among them, and, among their lower classes, is spread chiefly by infection, the advantages of inoculation not being understood by them, there is not an unusually large percentage of mortality, and often the attack is so light that the patient hardly "lies by for repairs."

Symptoms.—By many writers the course of this disease, from exposure to recovery, is divided into stages, each of which merges almost imperceptibly into the next.

(1) *The Stage of Incubation*, or the time from exposure or inoculation until the first symptoms appear. This interval in cases from inoculation consists of about seven days, but cases from infection proceed so much more slowly that the first symptoms do not usually appear until the twelfth day, rarely a day or two earlier or later, but never later than the fifteenth day.

(2) *The Stage of Invasion.*—In children the attack usually begins with convulsions, in adults with a sudden severe chill, followed by fever that increases so in intensity that a temperature of 105 degrees to 106 degrees may be reached by the time the eruption appears, which is usually on the third day. Many constitutional disturbances accompany the fever and, like it, increase in severity until the eruption appears. They

consist of fullness, or pain in the abdomen, nausea, vomiting (often severe and obstinate), pain throughout the entire body, but especially in the middle and lower parts of the back, trembling, such weakness that the patient can hardly stand, and a sense of severe illness. There is generally intense headache, the face is flushed and the great arteries of the neck throb violently, with the pulse from 120 to 160 per minute; but sometimes the face is sunken and pale, and the extremities cold. There is great thirst, the tongue and lips are dry and parched and the tongue is likely to be thickly furred; there is no appetite and constipation is usually prominent throughout the entire course of the disease, but there may be diarrhea instead.

In two days there are likely to be inflamed and swollen tonsils, sore throat, hoarseness, and sometimes a condition resembling catarrh. Occasionally there are nervous symptoms at the beginning, such as restlessness, delirium, drowsiness, stupor and coma. Convulsions are frequent in children, and sometimes occur in adults. The intensity of the symptoms during this stage does not always indicate the severity of the succeeding stages, and the diagnosis cannot always be positive until this stage has passed.

(3) *The Stage of Eruption.*—The eruption begins upon the face, especially the forehead, and upon the scalp and neck, and, as already stated, usually first appears the third day, but may come on the second, or may not arrive until the fourth. It may be so copious that the minute red spots almost cover the skin, in which case, at this time, it is liable to be mistaken for measles, but in one or two days the papules of the eruption spread over the entire body, though not as thickly as upon the face. They may be separate or may run together. The eruption may appear at the same time upon the mucous membranes, and the saliva be greatly increased.

(4) *The Stage of Suppuration* begins in from six to eight days after the appearance of the eruption, is characterized by the maturing of the pustules and the discharge of their contents, and is the most dangerous period of the disease. More deaths occur on the eleventh day than any other, but from the eighth until the thirteenth day there is very great peril, especially if the eruption is very copious, in which case one pustule is likely to run into another until the entire face is covered with a mass of corruption. The eyelids may be swollen shut and the features so disfigured as to

be unrecognizable. The feet, hands and genital organs may be affected in the same way and fearfully distorted.

The primary fever probably subsided as the eruption progressed, but now the secondary or suppurative fever begins, and frequently reaches a greater height than the first. It is usually ushered in by a chill, and, although intermittent in type and at its worst in the evening, increases in intensity until the suppuration reaches its height, then gradually declines as desiccation advances.

(5) *The Stage of Desiccation* (drying period) begins about the twelfth day and lasts from one to two weeks. The pus and fluids from the pustules dry and harden into scabs or crusts which, in severe cases, may cover the whole face like a mask. Gradually the scabs loosen and come off, the process being attended by the most uncomfortable itching.

Roberts thus describes a typical pock: "It starts as a bright red spot a little raised; enlarging and becoming more elevated, it forms a distinct papule on the second or third day, circular, well defined, flattened on top and having a peculiar solid, hard, dense feel, compared to that of shot or mustard seed under the skin. This soon changes into a vesicle, a little clear, thin fluid collecting in the center under the epidermis.

"About the fifth day a depression forms on the top of the pock. At the same time the contents gradually assume a purulent character. This change begins at the circumference, the central part still for some time remaining vesicular, and separated from the surrounding pus by a transverse partition, so that either part can be emptied of its contents without disturbing the contents of the other part. At this time a distinct ring of inflammatory redness appears around each pock, the pus increases and after a while the depression disappears, the pock becoming either globular or pointed at the top, while the color changes to yellow.

"About the eighth day the pustule is at its height, having arrived at the end of the stage of maturation. It then undergoes retrograde changes and within the next two or three days either bursts, its contents discharging and drying up, thus forming a yellowish-brown scab, or it shrivels and dries up without rupturing. In from eleven to fourteen days the scab usually separates, leaving a reddish-brown stain, which remains for a variable period. Sometimes the scabs remain adherent a long time, especially about the nose and on the scalp. When they fall off the body generally

there is a fine, dusty scaling of the skin and where its deeper layers are all destroyed a pit is left which finally becomes of a dead white color. The course of the eruption is greatly modified by the various circumstances peculiar to each case. The skin between the pocks is usually of a deep red color and feels sore and tender, and there is nearly always such intense itching that the patient can hardly refrain from scratching, although this aggravates the soreness and adds greatly to the final disfigurement."

Treatment.—The patient should be confined in a single room and be kept quiet in bed. His room should be large, light and well ventilated, without exposing him to drafts, and its temperature should be kept as nearly as possible at from 60 degrees to 65 degrees. Carpets, curtains, surplus bedding and all other furniture that can be spared should be removed at the very beginning. All surroundings and conditions must be made as healthful as possible. Cleanliness is of very great importance. The room, patient, clothing and bedding must all be kept clean. The linen should be changed often, and that removed should be plunged immediately into hot water and kept boiling for thirty minutes to secure thorough disinfection.

Begin with a scant diet of easily digestible food, giving fruits, especially baked apples, a prominent place. A little later the diet should be gradually increased, as by the addition of soups, beef tea, beef juice, jellies, etc., and care taken to furnish sufficient nourishment to keep up the strength of the patient, especially when a copious eruption or other severe symptoms give warning that the struggle is to be long and hard. The suppurative stage is the most trying one, and the early management must be such that the patient shall reach it in the best possible condition. The best drink is cold water and the patient should have all that he wants of it, but lemonade, milk and mucilaginous drinks are permissible. Stimulants of all kinds are to be prohibited at this time.

The fever is best controlled by giving from three to five grains of quinine once in four hours, and by sponging the face, hands and body in water as hot as can be borne, since opening the pores facilitates the escape of heat and poisonous exhalations. Sponging at this time is better than immersion baths.

For the headache apply ice compresses or ice bags to the head.

For sore throat hold bits of ice in the mouth, apply ice compresses to the throat, and use a gargle of one part of listerine to seven parts of water every hour.

For vomiting hold ice in the mouth; in some cases sipping hot water and applying a hot fomentation to the stomach will be found to serve the purpose better, and sometimes a Seidlitz powder will give relief.

For constipation saline laxatives should be used to secure a free movement every day, for which purpose a teaspoonful of granular effervescing phosphate of soda is a good remedy.

For diarrhea give from twenty to twenty-five grains of sub-nitrate of bismuth every three hours; should this not prove effectual add to the dose two grains of tannic acid; or, if the case be very urgent, give with the bismuth from five to fifteen drops of the tincture of opium.

For hemorrhage give three grains either of tannic acid or gallic acid every four hours, or fifteen drops of the fluid extract of ergot every three hours until the bleeding is stopped.

If nervous disturbances appear, three-grain doses of Dover's powder may be given every three hours until they are controlled. A warm bath often soothes the patient and induces sleep. If these measures are not successful, trional in doses of from fifteen to twenty-five grains should be given every four hours until sleep is obtained.

The urine should be drawn with a catheter, if retained beyond a reasonable time.

When the eruption appears especial attention should be given the eyes.

They should be protected from bright light by a green shade and bathed very often in a warm solution, composed of one grain of corrosive sublimate and four ounces of water, but it must be remembered that this remedy is a poison.

To prevent pitting and disfigurement, use has often been made, during the suppurative stage, of such devices as nitrate of silver, carbolic acid, opening each pustule as soon as it contains any pus, keeping the patient in a dark room, etc., but none of them has proved successful. Nothing can prevent scars if there is much destruction of the lower layers of the skin.

The better course is to apply ice compresses to the face, for although they may not so control the eruption as to make it less copious, they reduce the swelling and inflammation and, to some extent, prevent destruction of the skin tissues, besides greatly relieving the patient. Anointing the rest of the body with olive oil,

containing one-tenth its volume of carbolic acid, serves a good purpose and during the drying-up stage is especially valuable.

During suppuration much care must be exercised to keep up the strength by plenty of good, easily digestible food, and stimulants should be administered if there is great weakness or signs of collapse. Cod liver oil is often used with excellent results at this time.

The secondary fever should be treated in the same way as already outlined for the primary fever.

When the stage of desiccation arrives, a warm bath each day will not only be very grateful to the patient, but will assist in removing the scabs; the body should then be thoroughly dried with soft towels and anointed with the carbolized oil to prevent itching and assist the healing process. It will also do much to suppress the offensive odor often present in this disease. As disfigurement is greatly increased by scratching, the patient must refrain from it as far as possible. The scabs should be left until they dry and are rubbed off. The face may then be painted with the tincture of iodine to prevent warty nodules, but nothing will prevent scars if the lower layers of the skin have been destroyed.

Not until the patient has taken five or six baths at intervals of two days each, after all the scabs have disappeared, and has spent considerable time in the open air, should he be allowed to resume his place in the family or mingle with other people.

All bedding and furniture contained in the sick-room should be very carefully disinfected or, better still, burned; and until the room has passed through a most thorough course of disinfection no one, not immune to the disease, should be allowed to enter it. The nurse and physician, while attending a case of small-pox, should never meet other people without having first carefully bathed and cleansed themselves, dressed in clean clothing, and taken a thorough airing.

There is no way of aborting small-pox after it has begun. No intelligent person any longer thinks of attempting to modify it by sweating, vomiting, purging or bleeding.

VACCINIA.

(Cow-pox.)

As already shown, the discovery that small-pox can be robbed of its chief terrors by inoculation was of priceless value to the

human race, but it had this very grave defect: The contagion of the disease thus induced is as virulent and dangerous to other people as any other case of small-pox. It remained for Jenner, an English physician in 1798, to bring to the attention of the scientific world the curious fact, which for some time had been known and practiced by his townsmen, that cow-pox introduced into the human system by inoculation, now called vaccination, renders it for a time, at least, almost immune, and, in a large majority of cases, after thorough and satisfactory revaccination, constitutes an absolute protection against small-pox, and when it does not entirely prevent the disease, almost always so modifies it that it is attended by little if any danger.

Cow-pox, or vaccinia, is an acute disease caused by a specific virus and occurs naturally in the cow, but is seen in people only as a result of inoculation with lymph (virus), taken from the cow or from individuals previously inoculated. The contagion is by some believed to consist of germs belonging to the class known as micrococci, because they are always present in the lymph and since filtration of lymph destroys its virulence. Certain investigators also claim to have propagated these germs in substances prepared for the purpose, and from these artificial cultures to have successfully practiced vaccination; still it is not certain that the disease is due to these cocci rather than to another germ that has thus far eluded detection.

As skin diseases, scrofula, syphilis and the like, may be transmitted by vaccination from one person to another, too great care cannot be taken to secure healthy lymph, and although lymph taken on the eighth day from the vesicles of a patient is quite as efficient as animal lymph, the latter is much to be preferred because of the greater certainty of its being free from such contaminations. There is no danger in using the lymph obtained at properly managed vaccine farms from inoculating healthy heifers. It is usually preserved on bone or ivory points, and kept on sale at the drugstores.

Unless at a time of great danger from small-pox infection, a child should not be vaccinated unless in good health and until it is from six to twelve weeks old. The outside of the arm, midway between the shoulder and elbow, is the place generally selected for the insertion of the lymph, but for girl babies many careful mothers prefer to have it placed in one of the lower limbs, because of

the ugly scar it causes. The skin should be cleansed and drawn tightly and a place a half-inch square scarified by cutting many parallel and cross lines with a lancet or sharp pointed knife just deep enough to scarcely start the blood, then dip the vaccine point in water and thoroughly rub its charged sides upon the scarified surface, and when it has dried protect it with a little cotton-batting, or soft cloth. If there is any erysipelas or suppuration in the house keep the place of inoculation protected by covering it with a pad of antiseptic cotton.

Soreness begins in two or three days and about the eighth day the vesicles reach their most perfect stage, but the swelling may continue two or three days longer. There is more or less hardness and sense of tightness of the skin, itching, heat, pain and stiffness, and during maturation there may be fever, sometimes reaching 104 degrees. In about three weeks the scab which has formed falls off, leaving a permanent scar. If the first vaccination fails or is only partially successful there should be revaccination in a few days, and it is necessary to revaccinate after puberty, no matter how perfect the vaccination may have been in early childhood. If this revaccination is thoroughly successful it is thought by many to be sufficient for the remainder of life, but vaccination is not an invariably permanent preventive, and a person exposed to small-pox should be immediately vaccinated, whether he has ever been vaccinated before or not, for the stage of incubation in cow-pox is shorter than that of small-pox and the severer disease may thus be averted. When small-pox has begun vaccination will in no way modify its course. There is a much smaller proportion of deaths from this disease in persons in whom the effects of a single vaccination have so far worn out as to render them no longer immune, than there is in people who have never had any protection. Vaccination may lead to blood poisoning and erysipelas, but these cases are extremely rare.

Treatment.—It usually is necessary only to protect the arm from irritation. The vesicles must not be scratched and the scab should be left until it falls off. In case of much inflammation the part should be covered with wet lint, cream or powdered starch. During the fever the child should be kept in the house and given a mild laxative, as a teaspoonful of castor oil or Epsom salts, as occasion may require. If unusual complications arise they must be specially treated.

YELLOW FEVER.

Yellow fever is an acute, specific, highly infectious disease, occurring chiefly in epidemics within certain geographical limits in tropical or subtropical countries. Although skillful scientists have long looked for the micro-organism which produces it, and several have at different times announced its discovery, no one has yet succeeded in isolating a germ that has been found in over fifty-six per cent of the cases investigated, including even post-mortem examinations, nor in finding one that by inoculation produces symptoms in animals sufficiently like those of yellow fever to warrant the conclusion that they are those of the disease itself, or of a modified form of it. So good an authority as Guiteras says: "As far as our present methods go, it is impossible to distinguish between a drop of yellow fever blood, and blood from a healthy man." Yet no intelligent person any longer doubts that yellow fever is a germ disease, for its phenomena can be explained upon no other theory.

Bad sanitary conditions will not produce the disease, *de novo*, but they furnish excellent soil for its propagation, for when once introduced the infection increases with great rapidity in decaying matter and all kinds of filth. The germs are transmitted through the air and may enter the lungs through the breath, and thence find their way into the blood, or they may enter the system upon contaminated food, but it is probable that the usual mode of infection is by their settling upon the lips or being drawn into the mouth, and finding their way in the saliva to the stomach, thence to the upper portion of the small intestine, which is their favorite habitat, and, rapidly multiplying, produce the poison that by absorption gives rise to the disease. One attack, however light, renders the patient immune ever afterward. Natives of yellow fever countries are less susceptible than immigrants, and negroes are less liable than whites, and, when they do take the disease, have it in milder form. The time from exposure to the appearance of the first symptoms varies greatly, ranging from one to ten days.

The following treatment for yellow fever is given by Surgeon R. D. Murray in the report prepared for 1898 under the direction of the Supervising Surgeon-General Marine Hospital Service of the United States:

I have seen yellow fever in twenty-one summers and in every month, except February. The elimination of yellow fever from

our nomenclature will follow when there is a proper conception of the influence of clothing, bedding and unclean bedrooms as transmitters. The disease is borne for some distance; the infection is stronger at sometimes and places than at others; whether it is intensity or quantity I do not know; it may be diluted, and is transmitted by clothing, bedding and related articles. Hair from the dead has transmitted it; corn sacks, blankets and old newspapers have carried it; mountains of filth will not produce it; but they may give it a new nidus or garden from which it goes out "seeking whom it may devour." The cleanest town in the South may have a severe prevalence if the people insist on disobeying the advice of the health officials.

In 1875, as a result of several post-mortems and an attack of the disease, I came to the conclusion that yellow fever is primarily an inflammation of the duodenum. Many post-mortem examinations have since convinced me that the primary lesion is in the duodenum, and I insist that the mildest cases have a lesion in that organ which can be demonstrated, if due care be taken. The same after-death examinations, as well as bedside experience, have shown that the death-dealing process is not the "inflammation" that I was taught thirty years ago to understand as inflammation, i. e., there is no proliferation of cells or tissue, and no new growth.

There is a primary involvement of the duodenum and the symptoms of the disease generally follow in regular order. The mildest cases have a tender duodenum—if you know how to press—and a little backache (note how close to the spinal column the duodendum lies.) If the stools could all be examined, sometime a mass of white mucus with a black or brownish middle would be found. Perhaps there would be a stool of black mucus only once; but it is fair to say there is always a clay or bismuth stool with the mucous clot stained with black. In bad cases the upper intestine and stomach are also involved.

Sometimes the symptoms come in such quick succession that we think the attack is necessarily fatal. Many times in such cases we have no chance to ask the patient how matters fared with him twenty-four or thirty-six hours before, when he was sick, but would not admit it. Walking cases are as common in this as in other bed diseases. I have known a man, suffering with headache, to remain on duty three days, then vomit black on the stairs

on the way to his death bed. I have given immune certificates to persons who did not go to bed at all.

In ordinary, the patient should like the medical attendant. If the physician is distrusted, he should be called out, that a favored one may step in. Consultations over a patient are injurious. I would have the doctor do his share in keeping up courage, hope and life-purpose in his patient; to minimize the aches, distress and fears, and to carry the patient's mind away from the now with its dreads to to-morrow, with its rewards or revenges. Several people are living now because, in their desire to take vengeance on me for what they thought was my indifference, they forgot themselves and their condition.

Not every case needs treatment.

Of one hundred cases, seventy-five need only to be let alone, both by physician and nurse. They will get well under any plan of treatment and under miserable local conditions; notably so of infants, who, if they die, are generally sacrificed by curds or some acrid medication. These seventy-five are "cases" and should be recorded, but only for the sake of good records and to establish their immunity. They should receive only what occasion demands and be watched for untoward incidents. Of the other twenty-five, some will need formal attention and careful procedure; others will die in spite of all reasonable aid. Some vicious habit or chronic disease will add to the trouble, and in some cases uncontrollable fear will insure a fatal result.

My oldest patient to get well was 109 years of age; the youngest was 52 hours old when she threw up black vomit. One of my children had black vomiting five days after she was born. I know of the recovery of a chronic Bright's disease sufferer; of a morphiomaniac's recovery, and I last summer gave a diabetic doctor such cheerful counsel that he had a severe attack without fatal result, and has been in better health since than before. These cases show the triviality of the disease if taken in time. Yellow fever is the most honest, most trivial and cheapest to treat of all diseases that kill. It is honest because it comes with definite signs and leaves no trace, always assuring the afflicted one that ever after he will be immune; it kills, if at all, in a few days, and is merciful in the killing, as the doomed one is conscious to the last and does not linger, as a consumptive or victim of cancer; trivial, because fifty per cent of the cases are scarcely aware of

serious illness, and have no sequels to make them miserable the rest of their lives; also because it rarely takes off children, and by reason of the attack they gain the privilege of living in its habitat; cheapest to treat, because it is so, the medicine needed costing very little.

Treatment.—When called to a man who has had a chill sometime during the previous night, has a pulse of 100 to 112, with temperature of 101.5 degrees to 103 degrees, headache (cutting across the forehead), backache running down into the thighs, sore muscles, skin hot if you hold your hand on it a while (hands and wrists not hot to gentle touch), loss of appetite, white tongue (may be a yellow center far back; the red edges and red diamond on tip will not show at once), suffused eyes and notably or faintly purpled cheek bones with half-puffed upper lip, the hundred chances are you have a case of yellow fever. Yellow fever usually begins at night when the person is in bed and in a relaxed condition; malarial fever usually attacks when the patient is at work. Night watchmen have sickened in daytime. A restless early morning in bed, with little desire for breakfast, is a frequent history; everything eaten at breakfast does harm in such cases. Dengue pains are worst in joints; yellow fever soreness is between the joints. As to malarial coincidents, there is no rule for differentiation excepting, perhaps, the attack in bed or at work.

Give three or four compound cathartic pills at once, and as soon as possible give a hot foot bath with or without mustard and salt. An all-over bath is better, but is not always possible. Mustard at this time is really non-essential, but sometimes the patient thinks it is the proper thing; so with table salt. As to the cathartic, calomel at first is too slow and usually must be sent for; the pills contain enough of it and are in your vest pocket. Every yellow fever doctor should carry: First, doses of compound cathartic; next, compound acetanilide tablets; then, such other pocket remedies as may be needed on emergency. The parade of a small medicine chest is not advised. Do not begin to make a reputation for wonderful medical skill now. Dwell on the dengue symptoms and the signs of malaria, and without great formality convince your patient that "it is not yellow," but do not say so. Keep back information as to the actual temperature all the way through. No patient should ever hear that his temperature went above 102 degrees until after he gets well. (I saved a doctor once

by hiding his thermometer and using my French scale, which he could not translate.)

Give as soon as convenient, or, if fever is above 102 degrees, at once, any coal tar derivative in seven and a half grain doses, with some bicarbonate of soda and caffeine. The antikamnia compound is a good one. If powders or tablets are objectionable to the patient, give antipyrine. I nearly always use acetanilide with soda and caffeine. Have no objection to any, except that I like cheapness and simplicity. After the bath and a good sweating, under blankets, for from four to six hours, rub dry and cover with two blankets. (The clothing should have been hung outside the house or dumped into a tub of water; dispose of the wet sheets and blankets in like manner. When washed and boiled they are ready for use again; this hint in regard to prevention of infection.) If a person likes blankets next the skin they are better for prevention of skin shock. Quilts and counterpanes are objectionable because of the nasty odors they retain.

Repeat the coal tar derivative every three to six hours if fever keeps above 102 degrees; give for effect and not pro forma. Have the face and hands wiped frequently, give orange-leaf tea, Apollinaris water, lemon-grass tea, hot lemonade, ginger ale, small sips of ice water, and other drinks ad libitum, but not ad nauseam. Always start with the quantity you are willing the patient should have, and let him drain the cup; this particularly in the case of water. Try to supply fluid for the three or four days' sweating that will be kept up. Apollinaris is good on account of the common salt it contains; for some reason common salt is a good thing to give and has been grossly neglected. Passed Assistant Surgeon Smith, on duty at Ship Island last year, used it, methodically, about a dram a day, with excellent results. I have always given much salt in the food, but never gave it dry. No spirits of any combination should be even thought of for the patient.

The first bowel actions should be while sitting up for the first thirty-six hours or so for physical reasons, and for mental reasons, too. If the bowels are not freely and completely relieved within six hours, give a small saline and let the patient choose the kind. Castor oil is the best thing to give, but many so bitterly object to it that it is not advisable in all cases. Sulphate of soda is the next best. As a rule, the magnesias cause griping and flatulence. Seidlitz powders are good, but cause some gas and uneasiness—

however, the patient should have his choice, as he feels bad at this time and an insistence on one thing magnifies his dangers, in his own mind. Sometimes an extra pill will do the hoped-for duty. I do not object to syrup of figs, castoria, or other cathartics—only want results. If nausea is present an enema is in order.

DIET, OR LACK OF IT, A MATTER OF FIRST IMPORTANCE.

Do not deny food, but give the milk-like water of long boiled hominy or corn meal, salted and strained through cheese cloth. Keep the pot boiling all the time. Rice water is good; sago is better, as it is slightly aromatic, but my experience has been with the poor. Mexican atole is excellent, made from crushed lyé-hominy. Sometimes it is well to flavor with a bit of meat juice. Chicken soup, with rice, so thin as to be equal to starch water, is not to be tabooed. The point is to give no food for four or five days, but to appear to give food regularly. Often, you must promise food and abuse the nurse in the presence of the patient for the non-fulfillment of your orders, then apologize to the nurse outside.

If the first fever remedy tires the patient, or seems to do him no good, change the form; here lactophenin or amonol or antipyrine will serve as substitutes; maybe capsules of the same as you were giving will accomplish the object sought. Do not forget the bicarbonate of soda and caffeine. Remember always that the patient is sick; not the doctor.

Here I must advise you to carefully consider the question of malaria, for the Laveran organisms can do their work while the yellow fever germ is also active. In a malarial region it is advisable to give from forty to sixty grains of a cinchona salt in the first twelve to twenty-four hours, in order to ward off or forefend a malarial chill, which might occur during the period that should be yellow fever convalescence. I lost two patients from malaria, twenty years ago, when they were convalescing from yellow fever. In non-malarious regions, or on shipboard, no such caution is necessary, but in Mobile, New Orleans, Scranton, or the back country, care must be exercised. The preliminary cinchonidia or quinine may be given with the compound cathartic pills, and it is believed that early cinchona aids in producing calm in or to the patient. Do not give all at once, and do not expect the cinchona salt to act instead of the coal tar products. Give them together, or nearly so.

After thirty-six hours or so give an enema every day and try to have a bed-pan used. It is impossible for some to use a bed-pan; in which cases have the patient helped up on a vessel or commode. Instruct the attendant that the patient must be helped, and not allowed to use his own strength; his muscular force must be saved. If the expected does not occur, give another enema with a long tube. A short catheter of thirty or thirty-two caliber should be in every yellow fever doctor's pocket, which, attached to an ordinary self-injecting syringe, makes a long tube. The large catheter has saved many lives; it may be washed and used again; do not fear infection.

Enemas may be made most quickly with soapsuds and molasses; ordinarily soapsuds will suffice, later on not too strong. Consider the stools and if they are not sufficient in quantity, and you have reason to believe there is a fecal matter high up, give a dose of castor oil, two drams, and olive (not lard) oil, six drams, more or less as occasion seems to demand. Lemon juice is the best vehicle for the oil. Perhaps it will be best to tell the attendant to give the potion as if you knew nothing about it. Patients like to circumvent the doctor! I believe that small doses of castor oil and large doses of sweet oil will not produce the frequent contractions of the colon and the common intussusceptions of the small intestines that are found post mortem. Constant peristalsis downward is necessary; harsh purgation is to be avoided. This remark does not refer to the primary emptying of the bowel, but to repeated emptying efforts by calomel or pills or salts to insure a daily bowel movement. Olive oil does not cause the bowel strictures that I dread—I think small doses of castor oil will not. I prefer to mix them and have saved many lives by this plan.

For nausea use ice about the head, face and neck. A piece of ice in a cloth, rubbed rapidly about the lips, temples and neck, will keep down almost any offensive dose. If the nurse cannot do it effectively, or does it rudely, do it yourself. Give cocaine in one-fourth grain tablets floated down the throat, repeating as required; solutions do not accomplish the object as well, and as patients are human beings they might be poisoned. Dr. Thorington of Colon introduced cocaine as a remedy in yellow fever nausea, in doses of two to three grains in solution. I think that I was the first to insist on small doses in tablet form floated into the stomach, where it is needed. Bathing the face frequently with vinegar is excellent

to subdue nausea. Eau sedatif is praiseworthy for the vinegar it contains. Elegant toilet waters are pleasing to all and possible to some. Mustard to the upper part of the abdomen is always to be resorted to, but avoid sickening the patient by putting the pungent mass too near to his nose. Look to the covering, the pillow, the mattress, the commode, the nurse's breath, or other condition, as a cause of nausea. A fresh sheet, or pillow case, or pillow sometimes makes a "lot of difference" in the matter of comfort. Do not forget the bowel peristalsis; the "duodenal bloody sweat" may be trying to get up into the stomach, and maybe an enema from a long tube is now essential to produce quiet. To relieve restlessness and the aches and "tired feeling" it is well to briskly rub the legs and back with a coarse towel under the cover every three to six hours. Massage through the cover is sometimes grateful.

After sixty hours, in ordinary, examine the urine. If albumin appears as a trace give more fluids. If the quantity increases from five to twenty per cent, give turpentine in seven to ten drop doses every four hours. For five per cent albumen nothing but more fluid is necessary; if it increases to seventy-five per cent give more turpentine. Rub the chest and back with turpentine, not so much for absorption as to put your charge in a turpentine atmosphere, to prevent him from smelling and tasting the medicine. Do not let the patient know that you have examined, or want to examine, the urine; have portions saved without his knowledge. It is amazing what quantities of turpentine can be taken without harm. There is no danger from strangury. I have given half, sometimes a teaspoonful, to children where there was suppression, and generally with good effect. But it is not advisable to give all that may be considered necessary in a case at one dose. Turpentine is a diffusible stimulant and a good styptic; it is laxative also. I have never seen a particle of benefit follow the administration of digitalis. Large enemas of water, about the temperature of the air, or cooler, placed high up, do much good if retained. Please note that the kidneys are not inflamed, but rather paralyzed.

For sleeplessness after the second night give sulfonal in fifteen to thirty grain doses, and repeat if necessary in three or four hours. Bromide and chloral are good, but are often borne badly. I used trional once with good result. Sleeplessness is often due

to the odor from a dirty quilt or pillow; sometimes to a lumpy mattress. These may seem trivial, but it is a doctor's business to look out for his patient. In some cases a woolen shirt—a sweater—is necessary, as in restless children and persons who will not keep the arms under cover.

As the fever subsides diminish the remedies and increase the food, but it is generally unsafe to give anything like milk or eggs before the fifth or sixth day. The patient will not starve to death, but if he is fretted by a great lot of rules, or unpleasant attendants and surroundings he may not get well.

COLLAPSE.

Collapse is a horror. Generally an enema with a little whisky and turpentine, given with a long tube, will do good. Hypodermic strychnia, brisk rubbing of arms and legs and back with mustard is to be adopted. It is always necessary to procure an action from the pylorus downward. If this is not done there will soon be black vomit. A deft administration of olive oil, one to three ounces, is a life-saver. Collapse is usually caused by an influence equivalent to surgical shock, and the organs through which the shock comes are in order of frequency—the stomach, from excess of, or because of faulty food; the skin, from chilling by getting up or getting uncovered; the brain, from hearing bad or unwelcome news. To avoid collapse it is needful to prevent any shock to the organs mentioned. Whatever the origin of the collapse, the treatment is the same, but in case of mental disturbance some abusive or consoling talk, as the case requires, must be indulged in also. More people have died in consequence of too early or imprudent feeding than is generally supposed. I have saved a life by insisting on having a window shut down to prevent the entrance of “the lovely breeze.” Free ventilation has caused the death of many; so has the sleepy nurse who let the rolling patient get naked in the chilly hours of the early morning; so has the gossipy neighbor, who consoled the convalescent by telling him of the death of a friend, or the outbreak of fever in the town to which the patient's family had fled. There is another source of collapse. During early convalescence there is an excessive venereal desire, and under such circumstances conscience is much dulled or dead. It is necessary to warn the partner, who is not sick, or arrange that man and wife shall not be left alone until convalescence is complete.

Thus nurses of the opposite sex are to be doubted and tabooed, if possible.

I am confident that collapse, whatever its apparent cause, is generally accompanied with an obstruction of the small intestine and oftener in the upper part. I would like to say that the shock caused the obstruction. Sometimes it is food—then high up; sometimes it is intussusception—then lower down; sometimes it is due to a contracted colon, but if the patient could have been permitted to lie in quiet there might have been continued peristalsis. There are some who dispute my mechanical theories and the effects of mental conditions.

SECONDARY FEVER.

The secondary fever (that of after five days) is a ptomain poisoning and needs some modifications of the routine. Give antipyretics and high clysters for effect and increase the food. Ice to the head and rubbed down the spine, every half hour rolling the patient from side to side, will do good. Alcohol will do much good at this stage; the patient's choice is the form to use; brandy is the worst form as it produces hiccough. Dry catawba has served me well. Gin is the best form, as it may assist the kidneys. I have never seen any benefit follow champagne; ginger ale is better.

Continue the turpentine if the albumin compels it. I think guaiacol rubbed into the skin of the abdomen would be beneficial, but I never had a chance to try it; if put into the stomach, it is liable to cause nausea and eructations. Chronic vomiting after four or five days may be relieved by cocaine, or one-tenth grain doses of calomel with one grain soda bicarbonate frequently repeated. One-twelfth grain doses of morphia hypodermically do a lot of good; watch the urine, for opium increases the albumin or the chance for it. Small blisters over the stomach do good service. Sometimes bismuth serves a good purpose; peppermint and soda have served well, but it is necessary to compel a through and through action of the bowels.

For five days give no food but thin starches. Milk kills, as does every sort of food that requires stomach digestion. Lime-water alone sometimes gives comfort to the stomach, but mixed with milk it often causes the milk to stay in the stomach to become curds in the half rotten duodenum. Patent and predigested

foods are all right in the ptomain fever and recuperating stages, but hurtful for the first four or five days; so with opium and alcohol.

The physician should remember always that the senses of the yellow fever patient are as acute as those of a puerperal fever patient and that all necessary subterfuges must appear to be absolute truth. I know of many deaths due to actual truth, brain shock and collapse following. There is no other febrile disease in which physis and the mind play such prominent roles. A constipated patient, or one who has a dreadful fear of the fever, will, as a rule, not recover.

Primarily, it is the physician's duty to be, or to appear to be, frank, nonchalant, observant, cheerful, confident, hopeful and positive; he must convince the patient by word or manner that he for one among the sick is not suffering with the "prevailing" fever and is not very sick. Except in disputed cases, a half dozen questions will elicit all the information needed for detailed action for the next twenty-four hours. As patients later in the disease are all embracing in acuteness of senses, it is necessary to be frank (not truthful) and to remember and adhere to whatever has been said before. Many a life has been lost by ill-advised sympathy, too much nursing and attention, too frequent dosing, and senseless gossip.

If obedient, the more ignorant the nurses in this disease the better. All the professional nurses I have seen are at odds with the doctor and continually try to convince the patient that when all fails he will bring order out of chaos, and, presto! the patient will be cured. The nurse should have only sense enough to obey orders. Dumb nurses would be ideal in all critical or extra critical cases. The doctor should know how to direct the nurse as to his duties and to emergencies and crises, and should be careful that no disputes arise. The sick person must depend upon nurse as well as doctor. I know of too many preventable, but not prevented, deaths due to strife between physician and nurse; unfortunately, in some instances the doctor was to blame in being careless in giving directions. I know of some cases sacrificed to the zeal of the nurse who "knew more than all the doctors."

FIRST AID TO SUSPICIOUS CASES.

In the Brownsville epidemic I was compelled to include within the cordon a small region inhabited by non-immunes. If I had acted in accordance with the laws of Texas then in force, I would have exposed many more people and had an area to care for nearly as large as Rhode Island. To protect the people outside the infected town and inside the guard line I supplied my guards and patrols with the medicines then in use, i. e., compound cathartic pills, mustard, and quinine pills, and gave directions for their use. Nearly a hundred cases were treated by the guards, in the country, without a death. Since then I have advised interested persons to provide the pills, mustard, and acetanilide in advance. Were I to outfit a guard line now, I would furnish compound cathartic pills, compound acetanilide tablets, and mustard, to be used while the doctor was being summoned. I have suggested to Major O'Reilley, of the Army Medical Corps, that the pills and tablets be added to the first-aid package of the troops who go into yellow fever regions, with instructions for a man to take a pill at bedtime if his bowels were not freed during the past day; to take more if he has a chill in the night, and to take a tablet if he suffers with headache. It takes time to get a physician, and I feel confident that if men are given a little instruction and the few necessary remedies there will be less suffering and perhaps less mortality. It is well known to Southern physicians that a dose of compound cathartic pills will stop a malarial attack, particularly in negroes, and it is believed that the use of the coal tar derivatives has lessened the necessity for cinchona in the treatment of malarial diseases.

I have tried to tell how to treat the yellow fever with a limited number of remedies. Any person who will carefully follow directions will succeed in keeping the death rate at about four per cent, and, counting accidents, age, habits and conditions, that is as low as can be expected.

For ridding the premises of infection after recovery, see chapter on Disinfection.

PREVENTION.

As one in perfect health is less susceptible to this disease, personal hygiene is very important. In addition to avoiding every known means of infection, the bowels, kidneys and skin should be

kept in first-class condition. Constipation is especially to be guarded against; the bowels should be moved every day, by a mild cathartic if necessary, but excessive purging should be avoided. Partake freely of ripe, juicy fruits and fresh vegetables, all of which are safer for being cooked—safest for being boiled. It is not thought that yellow fever is a water-borne disease, but it is a wise precaution, especially at this time, since malaria is often a dangerous complication, to boil all the drinking water and thus free it from germs of every kind. Indulge but sparingly in meats; do not use alcoholic drinks; avoid great bodily fatigue, and undue exposure to the sun; for this purpose the pith helmet is the best hat.

The house should be on high, well-drained ground, where there is free circulation of air and plenty of sunshine, and so planned that the sun can shine into every room sometime during the day. There should be no closet under the stairs, and no dark or damp cellar. Damp ground, dark rooms, deep shade, imperfect sewers, decaying matter and all kinds of filth, favor the development of this infection and are a constant menace.

As chilling is one of the most dangerous of all the causative influences, great care must be taken not to cool quickly when heated, not to get wet, and not to expose the body to night air. Soft woollen clothing should be worn next the skin, plenty of blankets used at night, and care taken at all times to avoid draughts of cool air. There is far more danger from infection at night and on damp or cloudy days, hence leave your home as little as possible except when the sun is shining brightly; from ten o'clock till four is considered the safest for being abroad. If obliged to be out in the early morning, first drink a cup of hot coffee and wear warm clothing. During the day throw open all parts of the house to the free ingress of pure air and bright sunshine, but close them as night approaches. As the infection is denser or more virulent near the ground, as far as possible sleep up stairs.

Keep the mind occupied with work or pleasing themes, and do not worry about anything. The authorities are not agreed that fear of the fever increases the danger of contracting it, but they are united in declaring that when once the disease has seized a patient, great fear as to the result is one of the most damaging elements in the case. Many, who would probably have recovered had they been kept in ignorance, have been frightened to death on learning that their disease was yellow fever.

CHAPTER III.

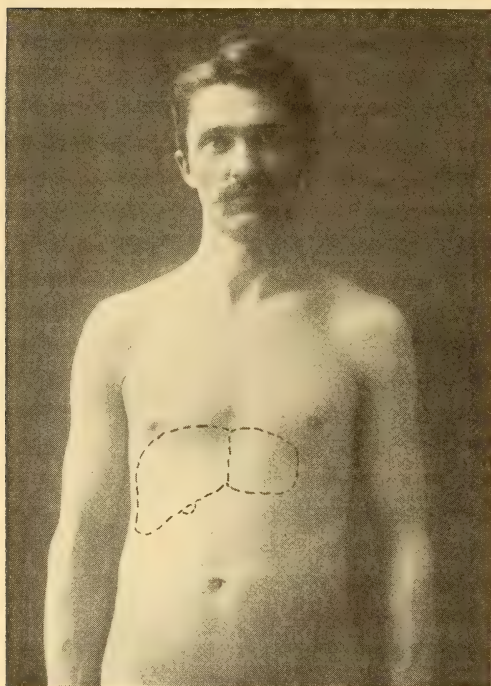
By R. E. McVEY, M.D.

THE LIVER.

The liver is the largest gland in the human body, and in many respects the most wonderful, since it varies more in size, shape and functions than any other. Not only does its weight in adults range from less than two to more than five pounds, but it varies greatly at different times in the same individual while in health, and much more when under the influence of disease. Its average size in infancy is one-twenty-fifth that of the person; in adult life one-thirty-fifth, and in old age one-forty-fifth; but in disease it may be reduced to one-eightieth, or enlarged to one-seventh of the weight of the entire body. In the average man of good develop-

ment it is about a foot across the longest way, which is from side to side of the trunk, six or seven inches wide, some three and a half inches thick at its largest place and contains about one hundred cubic inches.

In shape it also varies much, conforming to that of its owner. Any constriction of the waist, as tight lacing, not only presses this organ up or down so that it is often permanently displaced, but frequently causes deep fissures or creases in the substance of the liver itself. While these abnormal conditions are



Position and Relative Size of the Liver.

most usual among women, they are not uncommon in men accustomed to wearing tight belts.

It is situated under the right lower ribs, its lower border corresponding to the lower border of the ribs and its upper part is on a level with the fifth rib. It extends from the right side to a little past the middle line of the body. When enlarged it may extend much beyond these boundaries.

Although many of the most skillful scientists have given a great deal of study to the liver, some of the changes wrought within its tissues are still very little understood. It is not likely that all its secret ever will be found out until new methods of investigation shall be devised, but it has been learned with a good deal of certainty that its functions are at least fourfold. They are:

First. The preparation of glycogen or animal starch.

Second. The purification of the blood.

Third. The formation of new blood from the nutritive and life-giving elements, as derived from the digested food and poured into it through the great portal vein.

Fourth. The secretion of bile—a yellowish-green, bitter, sticky, nauseous fluid, most of which is stored in the gall-bladder until needed to aid in the processes of digestion, when it is discharged into the intestine. A powerful antiseptic, it is supposed to also serve a useful purpose in preventing putrefactive changes within the intestines; and, as it consists in part of what is thought to be waste and impurities from the blood, it acts as a scavenger by carrying this refuse into the channel leading to the sewer of the body.

The liver works all the time but is very much more active during the periods of digestion immediately following meals, and it is probable that the chemical changes then taking place in the formation of glycogen, blood and bile, also make sufficient heat for immediate wants, and that as this supply subsides the deficiency is met by chemical reactions upon the starch and fats; in other words, by burning fuel stored up for this purpose, and into the furnace with them are thrown the worn-out blood corpuscles and tissue debris.

Not only are its duties many and laborious, but its mechanism is so delicate that its finest ducts and tubules are only one two-thousandth of an inch in diameter, and as it must begin work upon the products of digestion as often and almost as soon as any

food or drink is taken, and must continue to receive and transform them until digestion is finished, no matter how poor the quality or excessive the amount, it is not strange that of all the organs of the body the liver is the one most likely to become disordered. Then, too, its derangements act more quickly than those of any of its comrades, upon the other organs, especially the stomach and intestines, and scarcely later upon the nervous system, particularly the brain.

This extreme sensitiveness, though often disagreeable to its owner, is a great advantage to his organism, for by its protests it warns him when he takes too much, too little, or the wrong kind of food or drink, when he takes them at the wrong time or swallows them too quickly, when he gets too much or too little exercise, or too little sleep, or has been exposed to cold, or is too anxious, or worries, or overworks his mind. The sage was doubly wise when to the question, "Is life worth living?" he replied: "That depends upon the liver," for so dependent are all the other organs upon this great gland that, more than the determination and will, it decides in advance what its owner shall enjoy or suffer and what he may and may not accomplish in life.

CONGESTION OF THE LIVER.

Congestion means the act of gathering into a mass, but in medical language the term is used to designate an unnatural accumulation of blood in any part of the body. It is the most common of all liver disorders. As already stated, this organ is very sensitive to kind and quantity of food and drink, temperature, rest, exercise and emotional excitement. When from any cause its cells are rendered unable to properly transform and remove from the blood certain materials as fast as absorbed and sent up from the intestines, the minute branches of the portal vein, by which they are distributed throughout the liver, are obstructed, and, becoming engorged and enlarged, so press upon other parts of the mechanism as to interfere with their free and perfect operation until, as the work continues to accumulate and the pressure increases, the whole gland becomes more and more helpless.

Symptoms. — The symptoms of this disease are numerous and varied, but of course do not all appear in any one case. The following are some of them: Either diarrhea or constipation, headache, mental confusion, nausea, flatulence, low spirits, loss of appe-

tite, sense of fullness, tenderness just below the ribs, pain in the back or right shoulder, loss of strength and flesh, alterations of vision, sleeplessness, sometimes jaundice, dizziness and difficult breathing, weariness and aching of the limbs.

Treatment.—In many cases all that is needed to restore an enlarged liver to perfect health is rest, but as that is permitted to this organ only when the current of digested nutrients absorbed and borne to it from the intestinal surfaces is greatly diminished, the amount of food should be cut down to a very low limit. The diet must be rigid both in quantity and kind, and the food most acceptable to the stomach may be just the thing you should not take. The popular idea that lean meat, dry bread and tea and coffee without milk are good in this disease, because easy to digest, is wrong, for they impose too much work upon the liver after leaving the alimentary canal.

Although farinaceous foods do not digest as readily, they are better, for when they finally enter the portal vein they are so far on their way to grape sugar as to cause the liver no trouble. Hence eat foods composed largely of starch, such as corn and oat meal, hominy, rice, sago, potatoes and fruits, either fresh, canned or dried. Nearly all vegetables are admissible, but peas and beans should be eaten sparingly. Take no eggs, unless it be a yolk now and then, and discard most meats, especially pork and veal. Boiled chicken, codfish and oysters may be taken, but pastries, stimulants, alcoholic drinks and tobacco should be let alone. Choose from this list such articles as best agree with you. Take mild exercise in the open air every day that the weather permits, and as far as possible avoid warm, damp, malarious regions.

CHRONIC CONGESTION OF THE LIVER.

In cases of long standing the derangements may have gone so far that rest alone cannot restore a healthy activity, and often the congestion is not limited to the liver, but has extended to all the internal organs. Of all remedies for chronic simple enlargement of the liver there is no other nearly as good as calomel if it be properly used, which means that it should be taken in very small doses, and its value is much enhanced by combination with pepsin. One-fifth grain of the former with two grains of the latter, after dinner two or three times a week, may be sufficient.

For quiet, useful and sure action upon the liver sulphate of

soda is also excellent. It should be taken before breakfast in teaspoonful doses in a half-glass of water. For cases of obstinate constipation, or of congestion caused by severe colds, one-fifth of a grain of calomel every two hours until five doses have been taken, and followed the next morning by a tablespoonful of castor oil, is a very reliable remedy.

The following is an old prescription and preferred by some :

Sulphate of soda.....	four ounces
Sulphate of magnesia.....	one ounce
Chloride of ammonium.....	two drams
Nitrate of potash.....	two drams
Common salt	one ounce

Powder finely, mix and keep well stoppered, in a large-necked bottle, and take a teaspoonful in a half-glass of water every morning before breakfast. For quickly removing the bad taste and setting the system in order, this has few equals.

Effervescing phosphate of soda, in tablespoonful doses, is also good in these cases.

Sometimes all that the liver needs besides rest is a thorough washing out, to accomplish which drink a quart or more of water every day, in half-pints at equal intervals between meals. It should be boiled for fifteen minutes, then thoroughly cooled, and may be flavored with lemon to suit the taste.

Linseed meal poultices and hot fomentations applied to the region of the liver are often useful. The wet girdle is an excellent device for this trouble. It is best made from a piece of toweling nine or ten feet long ; wet about half of it, wring enough to prevent dripping, fold the wet end into several thicknesses large enough to cover the front half of the body, and, having placed it in position, wrap the dry part over it and around the body and secure the end with pins. It should be worn for weeks, sometimes for months, and it is better to have several and wash and boil them often.

If they injure the skin they should be discontinued for a few days, then worn again.

In cases where there is much pain, counter irritants, such as mustard poultices, may be applied, but they should not be worn long enough to blister. Massage, rubbing and pressing should not be employed, for such treatment of an inflamed and tender organ needing rest might do much harm.

The custom of prescribing tonics for the liver, such as iron,

gentian and quinine compounds, is often pernicious. Neither should the appetite be whipped up with condiments and bitters. Nausea is nature's method of calling a halt when the body has been too richly fed. You must obey its orders or suffer its penalties. Absolute abstinence from food is not advised. Meals should be taken at the regular hours, but must be made of the articles indicated and be as small as consistent with bodily health, until the liver resumes its normal activity, after which practice such self-denial as will not lead to a recurrence of the malady.

BILIARY CONCRETIONS.

(Hepatic Colic. Gall Stones.)

Gall stones are granular, friable masses formed in the liver, in the ducts leading from the liver to the gall-bladder, in this bladder itself, or in its outlet. They are from millet seed to hen's egg size; and are rounded, angular, faceted, or of very irregular shape, as where one stone is made up from several smaller ones, adhering together. They rarely occur in infancy and childhood, are common to both sexes during and after mature life, and are most often found in women beyond the age of forty.

They are yellow, brown, black, or brownish-green.

Just how they are formed is not known, but certain conditions of the general health are thought to be factors, and stagnation of the bile is probably favorable to their formation. Usually there is but one or two present at one time, but occasionally they exist in great numbers, and may completely fill the gall-bladder. Not until the stone begins its passage through the duct, or by stopping up the duct obstructs the passage of its fluids, is the patient likely to feel that anything is wrong, but at this stage, if the stone is of any considerable size, there is sure to be very severe pain, which is relieved only when the stone passes through into the intestine or, as sometimes happens, returns from the duct into the bladder.

These stones vary greatly in composition, but in by far the greater number of cases they are composed of coloring matter and the fatty substances of the bile, in which liquid this variety is soluble whenever it contains less than a saturating amount of these ingredients, hence, by changing slightly the composition of the bile, stones in the gall-bladder may sometimes be dissolved, and the formation of new ones prevented. Where the stone has entered

the duct, relief can be expected only when it has passed through.

Soon after the attack has subsided the stone may usually be found in the dejections by diluting with water then passing them through a coarse muslin or sieve, but in some cases the patient retains them for several days.

Symptoms.—The disease is a difficult one to diagnose with certainty, unless there has been a previous attack followed by jaundice, accompanied with constipation and light-colored stools; or unless the stones have been found. Heredity often throws some light upon the problem, as it is an affection likely to run in families. It is often associated with gout or neuralgia. It is likely to come on a few hours after a hearty meal, if not severe at first, soon becoming so, and continuing to increase until the patient is in terrible agony. The seat of the pain is in the upper part of the abdomen and under the free ends of the false ribs on the right side, from which it may radiate backward and upward, but never downward. The attack may be brought on by menstruation, indigestion, strong emotion, or by a sudden jolt or strain. There is likely to be vomiting and violent retching, and the patient is soon reduced to extreme weakness. The attack may last but a few hours, but in severe cases has been known to continue several days.

Treatment.—As relief will come as soon as the stone passes through the duct into the intestine and little can be done to hasten the process, the first effort should be to ease the pain, and this should be done if possible without resorting to narcotics. Heat is an anesthetic, not as powerful as morphia, but one in whose train no dangers follow. Place a large, moist, linseed-meal poultice between several thicknesses of paper and lay it upon a hot stove, turning often to keep it from burning, and when well heated apply the poultice as hot as can be borne to the affected parts, then heat another to clap on as soon as the first shall cool a little, and continue the process until the pain is relieved. In some cases ice bags bring more relief than hot applications. Strümpell recommends equal parts of chloroform and olive oil to be rubbed into the skin over the seat of pain by very gentle movements, but it is probable that this gentle massage does more than the drugs to bring the relief.

These stones are soluble in chloroform. An old remedy, and one that still has its advocates, was to locate the stone with the hand by feeling for it at the center of pain, then to throw into it

a teaspoonful of chloroform with a hypodermic syringe. The stone is thus dissolved, or so much of it as to facilitate its passage through the duct. The serious effect of the drug upon some people is the main objection to this treatment.

Drinking pure olive oil in very large doses has permanently cured many severe and obstinate cases of this disease. A half-pint should be taken once every four hours until relief has been obtained or a quart has been consumed. Be very careful to get pure olive oil for this purpose. The concoctions made from cotton seed, and other cheap substitutes, that are sold as olive oil, might be very injurious.

If the patient shows signs of collapse because of excessive pain the strength should be kept up with stimulants. Quinine, good wine, or strong coffee may be used for this purpose. A stone of irregular shape or very great size may become so impacted in the duct as to be removable only through surgical aid. The operation, if properly performed, is not a dangerous one and should not be postponed too long. Whatever the treatment it should be followed by a mild laxative to move the bowels gently, and measures to build up the general health. The patient usually recovers and the disease is often permanently cured.

ICTERUS.

(Jaundice.)

Jaundice is not a primary disease, but a result, a symptom pointing to some other disease to which it is due. The name is from a French word, signifying "yellowness," and is used to designate a morbid state of the system, characterized by the presence in the blood of coloring matter from the bile, which stains yellow the skin and the white of the eyes. Whether in health the blood contains any bile is uncertain. It was long supposed that it did, and that it was mechanically filtered therefrom by the liver, but the weight of opinion now is that it is a secretion formed in the liver, the ingredients being drawn from the blood and portal vein, but differing much from the product itself; and that jaundice is caused, not by a failure of the liver to act upon and purify the blood, but by absorption into the blood of bile already formed and excreted by that organ.

As fast as bile is formed it is conveyed through the biliary ducts to the gall-bladder and there stored until needed to aid

in the processes of digestion, when it is poured through the common duct into the intestine, for that purpose. This natural order may be interrupted by any obstruction in this duct, as by a stone (see Gall Stones), by the formation of a plug of mucus within the duct, by the closing up of the duct by a catarrhal thickening of its tissues, or by outside pressure as from a tumor.

Stopped thus in its course, the flow of bile is turned back into the liver, and absorbed and carried away by the blood. A complete closing of the duct is not needed to accomplish this, but merely that its caliber be narrowed enough to cause the bile to pass through it with some difficulty.

All cases of jaundice thus caused are known as *jaundice from obstruction*.

Experiments upon animals have shown that the pressure under which bile is excreted is extremely small, and that it enters almost as readily into the circulation of the blood as into its normal outlet. Even in perfect health very little force will thus divert it; the amount required being only the slight pressure needed to overcome that of the blood in the liver tissues. These forces are so nearly balanced that any considerable decrease of the natural blood-pressure leads to a turning back of the bile into the general circulation. This is what happens when jaundice follows great general bleeding, strong mental emotions, venomous snake bites, or any other depressment that renders the heart unable to do nearly its full amount of work. This variety of cases is called *jaundice by absorption*.

Malaria is a very prolific cause of jaundice, principally because the coloring matter, set free in the destruction of red corpuscles by the germs of the disease, is left floating in the blood and stains the tissues when a little later it is absorbed by them.

There are other varieties, but as these two classes embrace nearly all cases of the disorder, we will not discuss the others.

Symptoms.—The diagnosis of jaundice is usually very easy, for it is clearly seen in the yellow color in the face and eyes. The tint of the skin much resembles that caused by the action of the sun, but tan never affects the color of the eyes and jaundice does. The yellowness appears first in the eyes, then in the face, and gradually extends over the entire body. The mucous membranes are not usually affected and the lips retain the redness of health. The urine becomes high colored, sometimes very dark,

and stains yellow. The sweat, except under the armpits, seldom stains.

There is little if any pain; if present it is due, not to the jaundice, but to some accompaniment, or to its cause. The patient is likely to be fretful, peevish and much inclined to sleep, and his mind becomes sluggish and heavy. There is likely to be diarrhea, with stools of light clay color. In most cases of jaundice from obstruction there is severe itching, liable to extend over the whole body and to be worse at night. Loss of flesh and weakness usually follow, and there is slow, feeble pulse, and changes in the senses of taste and sight. Hemorrhages of the mucous membranes often occur, of which bleeding from the nose is the most common. In chronic jaundice hemorrhages are very grave indications; and nervous symptoms, such as delirium, coma and convulsions, are usually soon followed by death.

Treatment.—The treatment should be mainly directed to the disorders causing the jaundice, but as the latter may itself work serious injuries to the liver and the general health, it should not be neglected. Diet must be the chief reliance, for it is often very difficult to affect the malady with medicines. The patient should live upon such food as lean beef, mutton, skimmed milk and strained broths; and must avoid fat in every form, also sweet fruits, tea, coffee and all alcoholic drinks; and, if there be much trouble from gas in the stomach, food containing sugar and starch must also be discarded.

Relieve constipation by alkaline remedies, as a tablespoonful of Epsom salts every four hours until the bowels act freely. It is no longer thought wise to purge the patient, or to give emetics; for, although they may do good in some cases, they are liable to do harm. Digestion and secretion of urine are both aided by taking from one and a half to three ounces of lemon juice daily; and there may be free use of lemonade. Injections of from one to two pints of water, at 60 degrees Fahrenheit, retained as long as possible, are recommended.

Warm rooms and warm clothing should be provided for the jaundiced, and their chilliness is best treated in this way. Warm, vapor and Turkish baths are good to stimulate excretions by the skin, and their efficiency may often be increased by gentle massage. Itching may be relieved by using a five per cent ointment of calomel and lard, or by washing in warm soft water containing three per cent of carbolic acid.

Little can be done for hemorrhages, except when they are from the nose. An ordinary nose bleed can usually be controlled by bathing the face and head in cold water and applying cloths wet in cold water to the forehead, the patient using care to stand erect with the head thrown well back and his arms raised above his head, the blood being absorbed by a sponge, cotton wool or similar material held by an attendant. The frequent posture of bending over a basin is wrong, as it is likely to stimulate the bleeding. The nose bleed accompanying jaundice is often so persistent as to require plugging of the nostrils with cotton. Examination should then be made, and if blood is passing down the throat the back of the nares should also be plugged. To do this thread a small strong cord through one end of a short piece of leather shoestring, trim the other end smoothly and run it through the nose into the throat, and with forceps draw it through the mouth until about twelve inches of the small cord extends beyond the lips; tie this firmly around a piece of cotton as large as required to stop a nostril, leaving the free end of the cord about eight inches long, and draw the cotton back through the mouth snugly into the nares, then tie together the ends of the cord hanging from the mouth and nose. Serve the other side of the nose in the same way, then plug the nostrils with balls of cotton as before. The blood thus confined will soon form a clot, press upon the membranes and stop the flow. After twenty-four hours remove the lower plugs, cut the cords, draw the wads to which they are fastened out through the mouth, and gently cleanse the nostrils with cool water. Should the bleeding begin again, repeat the plugging.

The gravity of a case of jaundice depends upon its causes, for when they are overcome the jaundice usually fades away. The first sign of recovery is the return of color to the dejections, the last is the disappearance of color from the urine. The disorder is likely to run about six weeks and the patient usually gets well.

CHAPTER IV.

By R. E. McVEY, M.D.

RHEUMATIC FEVER.

(Acute Rheumatism.)

Although the germ has not yet been discovered, the phenomena of rheumatic fever are best explained by regarding it as a germinal disease, the poison of which is carried in the blood to all parts of the body, but affects most seriously those tissues which are composed wholly or largely of white or yellow fibers, such as the ligaments of the joints, the tendons of the muscles, and the membranes or sheaths covering the bones, cartilages, glands and muscles. Rheumatism is a specific inflammation of these fibrous tissues. Other parts are usually affected too, but their involvement is thought to be only sympathetic, due to their close proximity to these tissues; although it is probable that the serous membranes, which are the linings of the closed cavities of the body, may be directly infected and become diseased in the same manner as the fibrous ones.

The disease is most common between the ages of fifteen and forty, but is sometimes found in children from five to ten years old. It is more frequent in the temperate zones than in either very warm or very cold countries. Much exposure to cold was long considered the cause of the disease, but is now thought to be only a condition favorable to its development.

Severe labor and strain are also conducive influences, and about one-third of all cases of the disease are hereditary; that is, the sufferers have inherited such peculiarities of structure as to predispose them to the disease; but neither this nor any other of the influences named ever caused rheumatism. The system must first be infected; but when the poisonous germs have been admitted, these favoring conditions aid in their rapid multiplication, and thus become very important factors in developing the disease.

Symptoms.—The first symptoms are likely to be chilliness, then rise of temperature, weakness and general malaise, but not

often as much headache and thirst as in other fevers; tongue covered with a dirty white fur and red at the tip and sides; urine scant, acid and turbid, depositing reddish sediment upon standing. Pain in the limbs and perhaps in other parts also soon follows, increases rapidly and settles in a few or many joints, which soon become swollen and very painful. The suffering is likely to be severer at night than during the day, and is increased by the slightest movement, such as that caused by a person walking over the floor or the jar of a car or heavy wagon passing rapidly in the street. There is profuse perspiration with sour odor. The patient feels helpless and will not try to move lest he add to his torture and pain. The large joints are the ones most likely to be affected, such as the knee, ankle, wrist, elbow, shoulder and hip. The most characteristic feature of rheumatism is the tendency of the pain to shift from one part of the body to another and to attack new parts, meanwhile remaining in the joints first visited, or returning to them, or leaving them entirely for new locations.

The temperature is usually from 100 degrees to 104 degrees, but in severe cases with heart complication it may go as high as 110 degrees, when it is very likely to be fatal. Its liability to attack the membranes of the heart is its only really dangerous feature, for however painful, if this organ be not affected, it almost always runs its course and the patient recovers in from one to three weeks, though it sometimes lasts seven or eight, if not influenced by treatment. The fever is remittent in character and goes and comes quite suddenly and from no apparent cause. The same is true of the swelling in the joints. In a large proportion of cases the structures of the heart are affected. This feature is usually accompanied by dull pain beneath the breast-bone and a sense of heaviness in the chest. This is a grave form of the disease and should be treated with care, but the patient often recovers. Many suppose that rheumatism of the heart is caused by driving the disease from some other part to that organ by the use of external remedies, but this is a mistake. The trouble is a diseased condition of the heart itself, usually consisting of an inflammation of its outer covering, called the pericardium, which is a membrane composed largely of fibrous tissues, not exactly like those composing the ligaments of the joints, but very much resembling them. Modern investigators think that rheumatic infection upon entering the system is attracted

to this membrane in the same way as to the fibrous structures of the joints, but so much more slowly that it does not become affected until from five to eleven days later than the joints. Pericarditis is not the only danger, for endocarditis, or inflammation of the heart's inner lining, may follow, in which case, if death does not occur, the valves are likely to suffer permanent injury. As proper treatment at the beginning of the attack usually cures acute rheumatism in from one to four days, the disease may in almost every case be arrested before reaching the heart, and it is difficult to see how the importance of prompt and intelligent treatment can be made more emphatic than by a plain statement of the nature of the disease.

Treatment.—Since acute rheumatism is due to a septic poison that affects the whole system, it must be mainly treated by internal remedies in a general way, rather than by local applications. Salicylic acid is the great specific for rheumatism. It is best used in the form of Parke, Davis & Co.'s, or Warner's Salicylic Acid Compound, and should be taken in doses of a teaspoonful every four hours. It is not as likely to unsettle the stomach as most forms of the drug, but if not within the reach of the patient, the next best form is salicylate of soda. Take from ten to twenty grains every two hours, but if it causes vomiting reduce the dose or take the same amount of bicarbonate of soda a few times instead, then return to the salicylate. As soon as the pain and swelling begin to subside, reduce the dose. As the salicylate deteriorates rapidly, that found in stock in the drugstores is very apt to be worthless, for which reason it is better to have the druggist prepare it specially when needed. Many prefer wintergreen oil, one of whose principal ingredients is salicylic acid. It should be taken upon sugar or in capsules, from ten to fifteen drops every four hours. The bowels should be kept open by giving a tablespoonful of Epsom salts as often as may be required.

The alkaline treatment also has its advocates, and in some cases is a valuable remedy. It consists of the following:

Acetate of potash.....	two drams
Bromide of potash.....	two drams
Iodide of potash.....	two drams
Essence of wintergreen.....	four drams
Glycerin	three ounces
Water	three ounces

Mix and give a teaspoonful every four hours.

In cases that refuse to yield to the salicylic treatment it is well to combine the alkaline treatment with it, giving first one, then the other, every four hours. The following is valuable with either treatment:

Olive oil	two ounces
Chloroform	four drams
Laudanum	two drams
Tincture of iodine.....	four drams
Tincture of aconite.....	two drams

Mix and use as a liniment upon the affected joints, or use:

Salicylic acid	three drams
Lanolin	three drams
Oil turpentine	three drams
Lard	three ounces

After either of these wrap the joints in cotton batting or soft flannel.

Milk is the proper diet, but soups, soft eggs and other light foods are permitted. An abundance of acid drinks may be taken as often as desired. All alcoholic stimulants, meats and hearty food should be let alone.

The patient should remain in bed several days after he thinks he is well and use care to avoid exposure which might invite a recurrence. One attack seems to predispose to other assaults, hence the patient must be more careful than ever before not to expose himself to dampness, cold or other influences likely to assist in developing the disease.

CHRONIC RHEUMATISM.

Chronic articular rheumatism is a mild but persistent inflammation of the ligaments, membranes and cartilages of the joints, often resulting in their enlargement from thickening of the parts. Writers usually consider it under two heads: The first consisting of those cases that result from acute rheumatism; the other, of those that are chronic from the start and develop slowly until the joints become permanently altered. Some regard the two classes as of very different causation; others maintain that both may result from the same cause. There is much about the disease that is not yet understood, but it is certain that the same influences that favor the development of acute rheumatism are also

active agents in bringing forward both forms of this. It is most common in cold, damp, changeable climates, and finds its victims chiefly among those whose occupations require severe muscular exertion and much exposure to wet and cold. The larger joints, too, and those most used are the ones most often attacked, but the heart is not as likely to be affected in this as in the acute form, although the cases in which it is diseased are by no means rare. On the other hand, chronic rheumatism is not often hereditary, is more common among women than men, and is mostly a disease of advanced age, being rarely seen in children and youth.

In cases of long standing the inflamed and thickened ligaments sometimes adhere to and unite with the softer tissues lying next to them and the joints become fixed and immovable, often very badly deformed.

Symptoms.—There is great variety in the symptoms, as they are modified by the severity of the disease, the degree of its development and the habits of the patient. From slight pain, stiffness and swelling in one or many joints, there may be considerable pain and every degree of swelling, distortion, rigidity, to immovable stiffness and loss of several joints.

The pain in the joints is of a dull, heavy character and is greatest at night. The stiffness is usually greatest in the morning, and is somewhat relieved by exercise. Often when at rest through the day there is little if any pain, but resting permits the stiffness to return and it is soon as great as before. The symptoms are sure to be aggravated by changes in the weather, especially by increased dampness. Although the trouble is in his tissues, the rheumatic has been said to carry a barometer in his bones, so accurately do his stiffness and pains enable him to foretell coming storms. The tissues around the joints are likely to become thickened and show the greatest changes. There is often constipation and scant, high colored urine. Again the general health may be good. In case of bad nutrition, a teaspoonful of the following mixture may be taken three times a day:

Bitter wine of ironfour ounces.
Liquor potas. arsenitisone dram.

In case of acute attacks give either of the treatments for acute rheumatism until the pain is relieved, but not after that, for they are of little value for reducing thickened membranes and stiffened joints.

Warm alkaline baths (common baking soda, a tablespoonful to each two gallons of water, makes an excellent one) should be taken once or twice every week, and be followed by free friction. Turkish baths are also very valuable in the treatment of this disease.

Adhesions in the sheaths of tendons and other fibrous tissues can best be remedied by massage, passive motions, etc., continued month after month if necessary. In all friction and massage, care must be taken not to irritate the tender parts, or more harm than good may be done.

Wintergreen or peppermint oil, well rubbed in over the affected joints and followed by applications of hot sand, salt or cornmeal, will often afford great relief in acute attacks. It is best to have several bags, about a foot square and half filled with dry sand, that while some are in use the others may be heating in an oven, that by frequent changes the parts may be kept as hot as can be borne. A convenient and excellent way of applying heat is to fill a large jug with boiling water, cork securely and wrap in cloths sufficiently to prevent burning the patient, then place it against the affected part as he lies in bed.

Avoid exposure and wear only woolen clothing next the skin. If able move to a mild, dry climate. Discard all alcoholic drinks and very strong tea and coffee. Eat only nutritious, easily digested foods, as chicken, tender beef, game of all kinds, bread and butter, milk, cream, eggs, soups and acid fruits, and take moderate outdoor exercise in good weather, at stated times, but carefully guard against occasional overexertion. Keep the bowels regular and build up the general health as much as possible. The disease is very stubborn and its cure depends more upon climate and carefully regulated hygiene than upon medicines, but as some cases yield to treatment, internal remedies should not be neglected. The road is long and recovery can be reached only through persistence. Taking treatment for a time, then neglecting it until a new attack drives the sufferer to his remedies, will never cure chronic rheumatism.

MYALGIA.

(Muscular Rheumatism.)

Muscular rheumatism is a painful affection of the muscles, attended by most of the phenomena that characterize articular

rheumatism. It is commonly attributed to the same cause, but as it occurs chiefly in the muscles most subjected to stretching and strain, such as those of the shoulders, neck and loins, it is probably often due to a tearing or rending of their fibers. It is never general in its distribution throughout the system, like the articular form, but is confined to a single muscle, or to a single set of muscles. It may precede, accompany or follow the articular form, and it may be entirely independent of it. Many diseases, such as some of the infectious fevers and cases of chronic poisoning, are accompanied by symptoms commonly called rheumatism, and until the true nature of trichinæ was discovered its painful manifestations were classed under the same head. When the true nature of rheumatism is better known, it is probable that the term will be used in a more restricted sense and be made to include less than it does now.

Its favorite seat seems to be the loins. When located there it is called lumbago; when in the neck, torticollis; in the shoulder, omalgia; and so on, these names designating not different diseases but different locations of the same disease.

Symptoms.—Pain, more or less intense, in the affected muscle. This may be of a dull, heavy character until the muscle is brought into action or placed under strain, when it is greatly intensified; if in the back, it is almost impossible to stoop down. The muscles are very sore and tender when touched or pressed lightly, but often not as painful when grasped firmly. The pain is seldom permanent in one place, but wanders here and there. It is of both kinds, acute and chronic, and may last from a few hours to several months, and be of every degree of severity.

Treatment.—The treatment should be the same as in similar forms of articular rheumatism. Careful massage, preceded and followed by applications of dry heat, usually brings great relief. Electricity, if properly used, is also an excellent remedy. Four grains of quinine every four hours for three or four days usually relieves the trouble. When the disease is obstinate, one-tenth of a grain of calomel every four hours until the bowels move freely is beneficial. In chronic cases a four-grain dose of quinine at bedtime, in connection with the calomel treatment, is often useful. Sometimes hot vapor baths, by producing profuse perspiration, afford relief, but this remedy should be used sparingly if the heart is diseased. The internal remedies should be continued for

some time after the pain subsides and exposure and overexertion carefully avoided, since the disease is prone to return.

RHEUMATOID ARTHRITIS.

(Deforming Rheumatism.)

Rheumatoid arthritis is a chronic affection of the membranes and cartilages of the joints, the adjoining muscles and the articular ends of the bones. It is most common in women, is sometimes hereditary and most often attacks its victims when from forty to fifty years of age. Severe mental shocks, anxiety and care are thought to be causes, especially if coupled with combined dampness and cold when the body is insufficiently nourished from lack of good food. Poor health is a very prominent cause.

It may follow the change in life and is often associated with uterine disturbances, due, it is thought, to the reduced condition of the system at such times. The injurious and debilitating tendencies resulting from the privations of poverty and the lowered vitality caused by depressing influences of any kind predispose to the disease. It is aggravated by sudden changes in the weather.

Symptoms.—The first symptom may be enlargement of one or more joints, but more often this is preceded by a tingling, prickling sensation like needles in the hands and arms, or by neuralgic twitches in the ball of the thumb and inner side of the wrist. The disease comes on very slowly and is likely to first attack the overworked joints, as those of the fingers of seamstresses, laundresses, etc. It differs from acute rheumatism in attacking the small joints first, and in not being accompanied by acrid sweat and little if any fever.

Except in the quite rare cases in which it attacks the young, it is very chronic and spreads slowly from joint to joint with comparatively little pain; but the pain varies greatly in different cases, and in the same case from time to time. It is often most severe at night, being aggravated by the warmth of the bed; and as rest increases the stiffness, this feature is worst in the morning. Gradually the cartilages are worn away or absorbed so that the bones come together in the joints and wear upon each other until their shape and normal bearings may be greatly changed. Their sockets often become much distorted from the

gradual extension of the flanges, giving these joints a prominence that is increased by the shrinking and wasting away of their softer parts and the adjoining muscles, though the enlargement is mostly due to the increased size of the articular ends of the bones. As the joints grow more and more stiffened, until they become fixed and immovable, their pain and tenderness grow less, and new joints are attacked, to be also destroyed. Spreading thus from the smaller joints to the larger ones, the disease may go on for thirty years, and more, for it does not interfere with the general health and is limited only by the patient's life.

Treatment.—First remove the patient from the depressing influences, prevent all anxiety and worry, and cheer and brighten her trains of thought. In the acute attacks, accompanied with fever, absolute rest in bed is best, but as these give place to the chronic forms, moderate exercise is an advantage, but should never be carried far enough to cause much fatigue.

Except in the acute attacks the diet should be very nourishing and as plentiful as the patient can digest. Meat should be eaten freely and mustard taken with it. Malt liquors and good wines are an advantage if taken with the food. In an ounce of wine take from ten to fifteen drops of the syrup of iodide of iron with the meals three times a day, for a week, then skip three days, after which repeat as before. Good doses of cod liver oil should also be taken, especially during the winter months.

After two months of the iodide and oil, leave them off for two weeks and take a warm bath each day, following it with good massage, but be careful not to continue them to the point of debilitating the patient, for she needs all her strength to combat the disease. If heart affection be associated with the arthritis, the baths must be very brief and taken with great care and if any bad results appear they should be discontinued. Keep the bowels regular and build up the general health.

Some physicians prefer the bitter wine of iron prescription as used in the treatment of chronic rheumatism, given in this work. Five grains lithium carbonate two hours after meals is excellent.

Local vapor baths and imbedding the affected parts in hot sand may afford relief. Some cases are so stubborn that all treatment fails. It is very important that the disease be fought most thoroughly at its first appearance, for as it progresses it becomes harder to subdue. Cases that are not cured are sometimes checked and held in abeyance for years.

GOUT.

Gout is a joint disease caused by an excess of uric acid in the blood, in the form of urate of soda. It is most common in men, rarely occurs before the age of forty, and in two-thirds of the cases is hereditary. It may be a result of great fatigue, overexertion, or mental strain; but usually it is brought on by excessive indulgence in wines and malt liquors.

It was long called the disease of the rich, but is quite as frequent now among the poor. It is often associated with chronic lead-poisoning; hence, is especially liable to attack house-painters, type founders and setters, lead miners and smelters, etc. It is found with many other disorders, such as bronchitis, pneumonia, neuralgia, catarrh of the urinary and intestinal organs, and affections of the heart and kidneys. When it attacks the internal parts it is called irregular or retrocedent gout and is more dangerous. It may become chronic and is very obstinate.

In severe cases the excess of uric acid in the blood may crystallize as urate of soda in the cartilages of the joints, perhaps also in the muscles and tendons, and form nodules that can be felt beneath the skin. In the vast majority of cases it locates in the joint that unites the foot and great toe, but it may appear in any joint, especially if it has been previously injured, as by a wound, rheumatism, etc. Except in cases of long standing, each attack is nearly always confined to a single joint. Around this abscesses sometimes form and concretions of the urate may escape from them.

Symptoms.—Some or all of the following symptoms are usually present:

Digestive disturbances; loss of appetite; weight and fullness in the stomach; irregular bowels; heartburn; pain in the calves of the legs; slight fever with chilliness; mental depression; headache and irritable temper. Sometimes the attack is without warning of any kind, but acute gout always comes unexpectedly in spite of the premonitions, and surprises the patient like a thief in the night. Having retired and gone quietly to sleep, he is awakened about midnight by a severe pain which may be in the joint of the great toe, or in any other joint of the body. The pain rapidly becomes unbearable. The patient feels as if the affected joint were in a vise; he sighs, moans and throws himself about in bed; the leg, or even the entire body trembles with pain. Soon

after the commencement of the attack, the skin covering the joint begins to swell and redden, and there is fever with a full bounding pulse, dry skin, intense thirst, concentrated, red urine and great mental excitement.

Toward morning there is a remission, but the affected joint remains swollen, shining and very red, and the whole leg is slightly swollen. The next night the scene is repeated with equal severity. The following day brings another remission, and so on for a week or ten days, when the swelling, redness and pain gradually disappear, the skin peels away and the part returns to its normal state. This form of the disease is more common in Europe than in this country, but is here, too, and is increasing.

Gout sometimes takes an eczematous form and a rash appears upon the surface of the body, in patches here and there. The skin tries to eliminate the excess of uric acid in the blood, and is in part successful. With the microscope crystals of the urate can be seen in the rash; and often when there is no rash, they may be seen upon the skin covering the affected joints.

Treatment.—First: Oxidation—which means taking pure cold water and plenty of exercise in the open air. Secondly: Diet—taking certain kinds of food and letting some kinds entirely alone. The total amount of food should be reduced, and the patient should live upon such food as lean meat, fish, broths, green vegetables, and small amounts of milk, eggs, oatmeal and bread, and a very little fruit. He must discard all fat meats, potatoes, acid food and very hearty things of every kind; also wine and all malt liquors. If whisky is used at all at first, it must be in small quantity, the amount gradually reduced and soon entirely discontinued.

The leg should be placed in as comfortable a position as possible and the affected parts wrapped in soft flannel or cotton-wool. Hot compresses are useful, so are applications of dry heat. Regulate the bowels by enemas.

From three to five grains of carbonate of lithia in a glass of water may be given three times a day. Fifteen or twenty drops of the wine of colchicum three times a day soon brings relief, but as such internal remedies arrest the elimination of the poison, the next attack will come sooner because of their use, hence the better practice is to discard them in acute gout and rely upon exercise and persistently rigid diet. When one has had

gout he is sure to have it again, sooner or later, and prudence lies in making the intervals between the recurrences as long as possible

DIABETES.

Diabetes is a disease characterized by an excessive amount of urine, and is of two kinds: That called *Diabetes insipidus* (Polyuria), in which the urine contains very little if any sugar, being almost entirely water; and that known as *Diabetes mellitus*, or sugary diabetes, in which the urine contains sugar, sometimes in very large amounts.

The former is not nearly as serious as the latter and is usually curable. Although the average patient discharges from three to twelve quarts of urine in twenty-four hours it may not cause much depression of the system, and cases sometimes run for many years without any serious results, yet it is liable to reduce the vitality and pave the way for some other disease that will prove fatal. There are cases on record in which there was for a long time the enormous average discharge of from eight to ten gallons of urine daily.

Diabetes mellitus is a most persistent, serious, and, in its severer forms, incurable disease. Beginning gradually and running a quiet, insidious course, it usually has a firm hold before the symptoms have been noticed by its victim. The disease is not well understood, but many regard it as a nervous disturbance resulting in a failure of the muscular tissues of the body to absorb or utilize sugar. During health there are from one to three parts of sugar in every one thousand parts of blood. When the proportion becomes greater than three the kidneys, to purify the blood, try to excrete the excess with the urine, the amount they throw out depending upon the condition of the excreting organs, the diet, and the extent or degree of the failure of absorption by the tissues. This failure results in enfeebled, wasted muscles, a worn, tired and anxious look and a ravenous appetite. The patient is slowly starving for want of the nourishment he is unable to use, though furnished in abundance by the blood.

Another class of investigators, among whom Purdy is prominent, maintain that it is a result of a deranged liver, whereby those nutrients called carbohydrates, which in health make fat, are broken up and their elements combined in such proportions as to form sugar and waste; and that even albumin may be trans-

formed by chemical changes into sugar and urea, that its constituents are nearly the same as the united ingredients of these two substances which are not only found in diabetic urine but increase and decrease in the same proportions during the progress of the malady.

A slow, chronic disease, it usually requires from one to three years to run its course, but sometimes takes less time, and occasionally lasts ten, twelve, or even more years. It is more common among men than women, and chiefly occurs between the ages of 25 and 65 years. It is sometimes hereditary. Among the causes to which it is attributed are exposure to wet and cold, emotional disturbances, mental exhaustion, anxiety and grief, sedentary habits, physical violence, concussions of the whole body, diseases affecting the nerve centers, acute fevers, gout, rheumatism and syphilis. By some it is thought that high altitudes and cold climates are unfavorable.

Symptoms.—The most characteristic symptom is a largely increased amount of urine, often averaging from one to three gallons per day, paler than the natural color, and discharged with increasing frequency. Its irritating quality is likely to be so great as to cause a burning sensation in the urethra and inflammation at its opening, and sometimes irritation of the skin wherever it may happen to reach. It is heavier than healthy urine, has a sweet taste, often attracting flies and bees when discharged upon the ground, and has a sweetish odor resembling that of sweet apples or hay, and when discharged into a vessel or shaken in a bottle forms abundant white froth that is slow to disappear. The average amount of sugar daily passed in this way ranges from twelve to twenty-four ounces, but there may be much less or a good deal more. Urine analysis is the most certain way of diagnosing diabetes, and in many cases, until the disease is far advanced, it is the only way, but the presence of sugar, which is the positive proof, can often be detected by simple evaporation. Put all the urine passed in twenty-four hours in a kettle and boil it until it has evaporated; if the residuum is a sweetish mass diabetes mellitus is indicated.

The patient for a time may be well nourished, but sooner or later his muscles, especially those of the legs, become weak, and there is great fatigue upon slight exertion. The mouth is dry and parched, there is unquenchable thirst, and, as already

stated, a ravenous appetite, but later, because of overtaxing the digestive organs, this condition may give place to loss of appetite and even to loathing of food; and the red, glazed tongue of the earlier stages may become thickly covered with white fur. There is great emaciation and loss of flesh, sometimes amounting to fifty pounds or more in a few weeks. The patient becomes irritable, fretful and sleepless, and may be the victim of neuralgia and other nervous disorders. He has a low temperature and sensations of chilliness and takes cold very easily. Boils are a frequent accompaniment, sometimes great numbers of them. Gangrene may appear. There are often changes of vision. Consumption is a frequent accompaniment.

Treatment.—Most cases of diabetes insipidus and the milder forms of diabetes mellitus can be cured, but their treatment should begin early and be followed with great persistency. The objects aimed at are a lessening of the manufacture of sugar in the body and stimulation of the muscular tissues to a greater use of that which is made. The former must be mainly accomplished by diet. All sweets must be avoided, and as far as the patient can refrain from foods containing starch he should do so, for it is from starchy food that the sugar in the body is principally derived. He will probably take less of these in the long run if permitted to have them in limited quantity than if wholly denied them until his craving for them becomes so great as to lead him to break away from all restraint. Formerly the principal diet was fats and such other articles as assist the stomach to tolerate fats, but a strictly meat diet is no longer advised. Fresh meats, such as mutton, beef, poultry and wild game may be taken in moderate amounts, but as livers and oysters contain a good deal of sugar they should be excluded. Green vegetables, such as lettuce, water cress, radishes and cucumbers, and acid fruits and berries may be taken raw. Cabbage, cauliflower, string-beans, spinach, asparagus and celery may be eaten if cooked. Green peas and all beans except string-beans are better omitted. Cream, buttermilk and cheese may be freely used. Wheat bread and potatoes are so largely composed of starch they must be taken very sparingly, if at all.

The following substitute for bread may be more safely used: One cup Graham flour, one cup of the best bran previously scalded, one cup boiling water, two eggs, German yeast or baking

powder, salt to the taste, one cup of milk or water; mix with a spoon and bake in loaves.

Almond flour beaten up with eggs, raised with a little baking powder and baked in small tins, is recommended by some as very palatable and safe. A milk diet is now thought to be good only in very mild cases.

The tincture of opium, in ten-drop doses three times a day before meals, was long the standard remedy, but it is not as much used now. In many cases the following gives better results:

Arseniate of sodaone grain
Carbonate of lithiaone dram.

Mix, divide into twenty powders and give one three times a day in water after meals.

The following will often relieve the itching which sometimes accompanies this disease:

Calomeltwenty grains.
Acetate of leadthirty grains.
Extract of belladonnafifteen grains.
Subnitrate of bismuthone dram.
Carbonate of zincthirty grains.
Benzoated lardtwo ounces.

Apply once a day and paint the parts twice a day with phenol sodique.

The patient should take all the exercise in the open air that he can without very much fatigue. Horseback riding is the best. He must avoid all nervous, mental and physical excitement; must wear warm flannels next the skin and use great care against taking cold. A warm bath every other day, followed by brisk rubbing with dry towels, is a great advantage. He may drink all the cold water he wishes, but must let alcoholic stimulants of all kinds alone. The urine should be tested for sugar every ten days and the treatment regulated accordingly. The disease runs its course most quickly in the young. Strong, healthy men in the prime of life stand the best chance for recovery.

OBESITY.

(Corpulency. Fatness.)

Obesity or corpulence is such an excessive development of fatty tissue in the body as to become burdensome. It occurs

twice as often among women as among men, and is most frequent after forty years of age. Its most common cause is the habitual taking of too much food. Most people past middle life are in the habit of eating too much, though the excess at any one time may not be large. Too little exercise in the open air is another fruitful cause, and is often associated with the first, yet a few cases of obesity are found among persons who take a great deal of exercise and in those who eat less than a normal quantity of food. The condition can be regarded as a disease only when the habits of eating, drinking and exercise fail to account for it.

Alcoholic beverages very often cause obesity, and it is sometimes a result of disease, as of paralysis or other nervous disorders, anemia, etc., and it may be the first warning of the approach of some malady more serious than itself, in which case the danger signal is of great importance if the condition be complicated with heart or kidney disease. A very large proportion of those suffering from obesity inherited the tendency from their ancestors. Diabetes, gout and rheumatism are its frequent associates.

Treatment.—The main thing in the treatment is a carefully regulated diet, and while the authorities differ as to some of the articles that should be placed upon the prohibited list, all agree that the first step should be a diminished quantity of food, that a gradual reduction is better than a sudden, severe one and that the scanty fare must be enforced for months to be successful. The diet should be varied enough to keep up the health and strength, and a proper proportion should be maintained between its carboniferous and nitrogenous elements, that is, fats and starches are not to be discontinued, but limited. Most agree, however, that if butter and sugar are allowed at all, they must be taken in very small quantities.

Very little liquid should be taken with the meals, and no drink allowed until two hours or more thereafter. All alcoholic beverages, especially beer, must be discontinued.

Various courses of diet have been recommended. Lyman, in his "Practice of Medicine," says: "Milk and eggs furnish the best diet for this purpose. The patient should take, for twenty days in succession, not more than one-half pint of milk and one egg every three hours during the waking portion of the day. No other food or drink should be allowed. Under this treatment

the bowels become constipated and require gentle laxatives or enemata. As first this restriction of the diet causes faintness, weakness and sometimes dizziness, but in a short time these unpleasant symptoms disappear and the disagreeable consequences of obesity rapidly diminish. At the end of three weeks the diet may be varied and gradually increased."

Yeo, in "A System of Therapeutics," Vol. I, edited by H. A. Hare, Philadelphia, 1891, gives the following excellent summary:

"The albuminates in the form of animal food should be strictly limited. Farinaceous and all starchy foods should be reduced to a minimum. Sugar should be entirely prohibited. A moderate amount of fats should be allowed.

"Only a small amount of fluids should be permitted at meals, but enough should be allowed to aid in the solution and digestion of the food. Hot water or warm aromatic beverages may be taken freely between meals, or at the end of the digestive process, especially in gouty cases, on account of their eliminative action.

"No beer, porter or sweet wines of any kind should be taken and no spirit of any kind except in very small quantity. It should be generally recognized that the use of alcohol is one of the most common provocatives of obesity. A little Hock, still Moselle, or light claret, with some alkaline table water, is all that should be allowed. The beneficial effects of such diet will be aided by abundant exercise on foot, and by such a use of saline purgatives as to secure a complete daily unloading of the intestinal canal.

"Of animal foods, all kinds of lean meats may be taken, poultry, game, fish (eels, salmon and mackerel are best avoided), eggs.

"Meat should not be taken more than once a day, and not more than six ounces of cooked meat at a time. Two lightly boiled or poached eggs, or a little broiled fish, may be taken at one other meal.

"Bread should be toasted in thin slices and completely, not browned on the surface merely. Hard captain's biscuits may also be taken.

"Soups should be avoided, except a few tablespoonfuls of clear soup.

"Milk should be avoided, unless skimmed and taken as the chief article of diet. All milk and farinaceous puddings and pastries of all kinds are forbidden.

"Fresh vegetables and fruits are permitted.

"It is important to bear in mind that the actual quantity of food permitted must have a due relation to the physical development of the individual, and that what would be adequate in one case might be altogether inadequate in the case of another person of larger physique."

A very important part of every mode of treatment is muscular exercise, and it should be taken in the open air if possible, thus the better increasing heart action, inducing deeper and more rapid breathing, and assisting in a fuller oxidation of the adipose tissue. Mountain climbing is one of the best forms, rowing is good, horseback riding can be recommended, and a brisk, swinging walk until considerably fatigued is excellent.

Baths stimulate the excretory functions of the skin, and to this end a warm bath, containing a tablespoonful of common baking soda to the gallon of water, lasting from fifteen to thirty minutes, and followed by a cold spray and brisk rubbing, is valuable.

The advertised anti-fat nostrums are often positively injurious. Taking vinegar, or large amounts of other acids, using opium or tobacco, and starving the body to reduce flesh, must all be condemned as likely to lead to more serious consequences. Some cases of obesity are incurable, and in these it is better to attempt only a mitigation of the suffering by measures prescribed by reliable physicians and known to be safe, than to surrender one's self to the advertising charlatan, who in consideration of a fat fee may promise the impossible.

ACUTE NEPHRITIS.

(Bright's Disease.)

The kidneys are very often diseased. The chief reason for it is that the body must eliminate all injurious matter that enters the blood and must do it very largely through these organs, which often become infected with the poison they are required to throw out. Bright's disease was named after Richard Bright, an English physician, who discovered some of the pathological features of this form of kidney disease which might more properly be known as nephritis. It is classified in two forms: Acute and chronic. The acute form runs its course in a few days or weeks, and in rare cases lasts for some months. It is very liable to follow

scarlet fever, is often induced by other infectious diseases, as measles, small-pox, typhus fever and diphtheria, also by cholera, syphilis, etc., and sometimes is due to other causes. Pregnancy is sometimes thought to favor its development.

As the kidneys are so located as to make direct examination of them impossible we must, to determine their condition, rely upon urine analyses and such phenomena in other parts of the system as have been found to accompany their derangement; but, as these phenomena are often associated with other disorders, a positive diagnosis of this disease can be made only by analysis of the urine, which in this trouble contains albumin, casts and sometimes minute, and sometimes considerable, quantities of blood. Such an analysis requires experience, use of the microscope and some knowledge of chemistry, hence the patient should early consult a competent physician and secure an examination that will leave no doubt as to the nature of his malady.

The symptoms vary in different cases but some of the following indications are always present: Pain in the back and limbs; headache; chilliness followed by fever; diminished urine but frequent urination accompanied by burning sensations; constipation, but sometimes diarrhea; nausea; vomiting; bronchitis; swollen ankles and legs; swollen eyelids and face, the dropsy sometimes increasing until the patient is greatly distressed.

Treatment.—The patient should be kept very quiet, should remain in bed and be covered sufficiently to induce constant slight perspiration, thus somewhat diminishing the work of the kidneys. Hot fomentations upon the small of the back. If there be no heart trouble, hot baths lasting from thirty minutes to an hour, their temperature kept up by additions of hot water, followed by thorough rubbing, precautions against taking cold, and covering with warm blankets to produce profuse sweating. To aid in securing this result drink freely of warm water. The wet pack is in many cases useful. A dose of senna every other day to thoroughly move the bowels and eliminate injurious products that are normally excreted by the kidneys is especially useful in dropsical cases. But little medicine should be used. The diet should be milk exclusively. Many have been cured by the "milk treatment," which consists of taking no other food or medicine. He may drink freely of water and lemonade. Meats and stimulants are positively forbidden. When there is great distress chloro-

form, rather than narcotics, should be used. Opiates of all kinds are very bad for this disease, and mineral waters and medicines to act upon the kidneys would better be let alone.

Until far advanced the symptoms in the chronic are much the same as those in the acute form, except as revealed by the microscope, and the treatment is almost identically the same in both forms, hence, we will not here discuss chronic nephritis, but will add that if the patient wears warm flannels and carefully guards against taking cold he will be benefited by mild exercise each day in the open air, though this must not be continued until there is fatigue, and he must never go out when the air is either cold or damp. Sun baths are useful and his room should have an abundance of sunlight. Two or three quarts of milk should be taken daily, and the chances for recovery will be much improved by abstaining from all other food.

NEPHROLITHIASIS.

(Gravel. Kidney Stone.)

This disease is most common before the age of fifteen and after that of fifty years. It is usually due to a depressed or nervous condition, such as results from gout, rheumatism, dyspepsia and self-abuse. It rarely occurs from local causes, such as a catarrhal and ulcerative condition of the mucous lining of the pelvis of the kidney or of its prolongations, detached particles of which serve as nuclei about which the urine salts gather and adhere until a stone is formed. The presence in any of the vesicles of the kidney of a solid body, though very minute, as a clot of blood, or shred of membrane, may become the center of a stone. How the salts thus gather and form a calculus without such a nucleus at the start, instead of being washed out with the urine, is unknown, but it is probable that in by far the greatest number of cases the stones are thus formed and are due to constitutional causes alone.

The disease is not always painful. Sometimes the gravel, while small, are carried by the urine through the ureter into the bladder with little or no pain; sometimes they become large enough to obstruct the passage of the urine, inflammation sets in and the patient undergoes great pain, which usually, though not always, subsides with the passage of the stone; and there have been cases in which one or both kidneys contained large

stones without at all inconveniencing the patient. The disease is much more common in men than in women.

Symptoms.—Small concretions or reddish or whitish sediment in the urine when allowed to stand, and high colored urine that on standing deposits many acid crystals; dull, aching pain deeply situated in the small of the back, running down the side into the thigh, calf of the leg and foot, or running into the groin and testicle; sometimes pain very sharp and severe in these regions after hard jolting; these pains may run through all stages of severity and end suddenly after lasting from a few minutes to several hours, rarely a day; nausea and vomiting; frequent and urgent urination.

Treatment.—In the early stages of the disease the patient should carefully regulate his habits and diet and occasionally drink alkaline water. He should not eat heartily and should wholly abstain from such acid food as tomatoes, rhubarb, asparagus, and from wild game, shell-fish and highly spiced viands, should use little sugar, no beer and few stimulants; but may have bread, butter, milk, potatoes, eggs, beef, chicken, fish, rice, oatmeal, coffee and tea if taken while fresh and hot.

The medicines recommended by Morrow are citrate of potash, from ten to thirty grains, from three to four times per day; or the citrate or carbonate of lithia, two to five grains three times a day. Hot baths and hot fomentations over the kidney are valuable. Large draughts of cold water should be taken often; if the stomach is unable to retain it, frequent enemas should be given, the object being to increase the urine and thus help the passage of the stone through the ureter. The patient should be kept quiet and half unconscious during the severe pain. If hypodermics of morphia over the kidneys are not sufficient to do this, ether or chloroform should be used. It is very important that the patient be made as comfortable as possible. Relief from pain often results in relaxation of the parts and passage of the stone. In very severe cases a surgical operation may be the only recourse.

CONTRACTED KIDNEY.

This disease is most often found among old people. Both kidneys are usually diminished in the same degree, which in rare cases may be to one-third their normal size. In some cases it is regarded as a form of chronic Bright's disease; in some it follows

closely upon acute Bright's disease, as where the latter is a sequel of scarlet fever; and it sometimes appears as a primary disease. Its chief causes are alcohol, lead poisoning and uric acid. It may also result from malaria and syphilis.

Many other disorders are associated with it, as valvular heart disease, gout, uremia, bronchitis, certain forms of asthma, dropsy, disturbances of vision, severe headache, sometimes confined to one side of the head and sometimes darting down the neck, vertigo, poor appetite, irregular bowels, enlarged liver, profuse nose-bleed, hard pulse, clear and abundant urine.

Although none of these symptoms are conclusive, the presence of any considerable number of them are strong indications, and should prompt the patient to secure several analyses of the urine, made at different times, that its persistent average composition may be accurately determined, for this is the only way of diagnosing the disease with certainty. If the disease is present the urine should be found to be lighter than normal because containing less salts and other solids, should contain a few hyaline casts, some albumin, often some white and, more rarely, a few red blood corpuscles.

It is probable that contracted kidney is causative of most or all the disorders found in company with it. In the spirit of mutual helpfulness that seems to possess all parts of the body, as the kidneys become contracted, their filtering tubes diminished and their capacity for purifying the blood impaired, the heart tries to aid these organs in their all important work of purification by increasing the pressure and forcing the liquid through the remaining tubules more rapidly. Thus for a time the work is done by a part that should have been shared by all of the tubules, but as the degenerative changes go on and the filtering areas continue to contract, more and more heart pressure is required until that organ, able no longer to bear its ever increasing burden, becomes itself diseased. The increased blood pressure may have resulted in hemorrhages of the nose, stomach, intestines, lungs or other organs, but when the heart becomes unable to do the extra work complications rapidly multiply. The blood being no longer purified by an elimination of its salts and other urinary ingredients, uremia is especially liable to appear with its train of ills, such as headache, vomiting, diarrhea, pruritus, coma and convulsions, sometimes ending in death. The sight may be de-

stroyed through retinitis; dropsy is one of the complications to be feared; and sometimes apoplexy suddenly terminates the disease. Still the attack may pass off and the patient rally.

Not until the disease is far advanced is the patient likely to notice any symptoms to excite his suspicions, hence, it is usually impossible to determine how long he has been affected. It is probable that the disease often lasts ten years, or even longer. It is generally regarded as incurable, but the patient may be made very comfortable, and his life preserved for years.

Treatment.—The treatment consists principally of hygienic measures.

The patient must avoid everything that would lead to greater heart action, as fatigue, violent exercise or excitement, and should carefully refrain from eating or drinking that which might irritate the kidneys. According to his condition his diet should be meager or abundant, but milk is the principal food. Beer must be let alone, and all alcoholic beverages either prohibited or taken very sparingly. Corpulent patients should exercise moderately and regularly, but always stop short of fatigue. Warm baths are useful, with precautions against taking cold. The use of drugs could be of little value and might do much injury in this disease.

THE DROPSIES.

By T. H. PEERS, M.D.

We head this article with the plural because we desire to emphasize the fact that dropsy may result from several diseases, but in itself is not a disease. Dropsy may be defined as a certain condition of the tissues of the body whereby they contain too large an amount of liquid. This liquid comes from the blood, oozing from the blood vessels, particularly the veins, into the surrounding tissues. Instead of spreading through the tissues, it sometimes collects in one of the serous cavities of the body, making a sac of fluid. When it thus collects in the abdominal cavity, it is called ascites. It sometimes collects around the heart, and sometimes about or within the brain.

What, we may ask, are the conditions which tend to produce dropsy? A moment's thought will suggest the answer, which is: Anything that affects the walls of the veins so that the fluid part of the blood may leak through into the tissues, while the blood corpuscles are retained, and the things that favor this are pressure

inside the veins, and weakness of the walls of the veins. Those diseases, therefore, which allow the blood to accumulate in the veins, or prevent its return to the heart, or relax or weaken the walls of the veins, may produce a dropsy. From statistics it has been found that (1) Diseases of the kidneys, (2) Diseases of the heart, and (3) Wasting diseases like consumption are its most frequent causes.

In acute inflammation of the kidneys, the swelling usually begins in the face, particularly around the eyes, where the cellular tissue is loose and flabby. It next shows itself in the feet, legs and scrotum, and may continue till there is a general diffusion of serous fluid into the connective tissues of the entire body. The serous cavities are next involved, and we may get dropsy of the pleura, of the peritoneum, and even of the pericardium. The swelling is not continuously progressive, but comes and goes, as the parent disease increases or decreases in severity. The fluid in the tissues bleaches them, giving to the skin a very white appearance. If the skin is stretched very much it takes on a shiny appearance, and looks as though it had been greased. At times the distention is so great as to burst the skin, in which case the fluid leaks out rather rapidly, and the swelling decidedly diminishes. The amount of swelling does not accurately determine the severity of the disease producing it, and the patient sometimes recovers after very severe swelling over a large portion of the body.

In dropsy from heart disease, the swelling usually begins in the feet and gradually extends up the legs to the body. It then begins to affect the serous cavities, especially that of the abdomen, where the fluid accumulates, and, unless the heart disease is arrested, or the fluid drawn from the abdominal cavity, the abdomen becomes very large. The operation of drawing off the water is called "tapping," and, if properly done, is not at all dangerous. Sometimes large quantities of fluid are removed, and the operation has been performed as many as fifty times on one person. It is not a curative process, but gives the patient great relief, enabling him to breathe much easier, to get around much better, and to lie down and sleep. Cathartics and medicines that cause sweating are often used, and help to carry off the fluid, but the treatment should be directed mainly to the heart, which is the real cause.

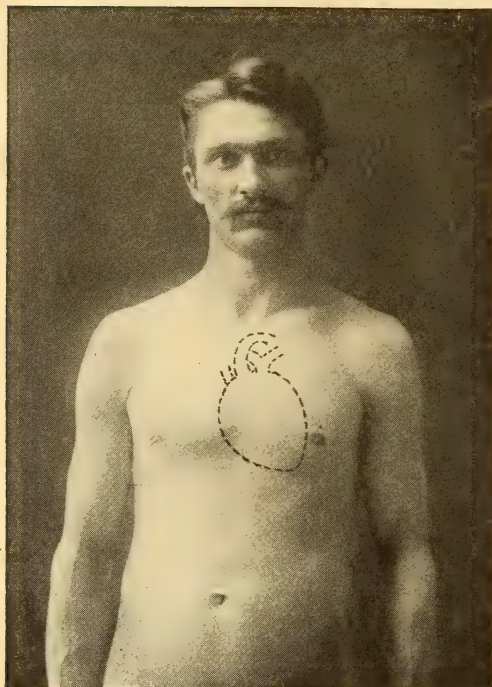
In wasting diseases dropsical accumulations often occur toward the end, and usually indicate a fatal termination. An exhaustive discussion of this subject is not intended here, our purpose being, rather, to correct the popular belief that dropsy is a disease, and a very fatal one. Dropsy is only a symptom of another disease, and is not a serious symptom, unless the disease causing it is one dangerous to life.

CHAPTER V.

DISEASES OF THE HEART.

By LOUIS C. DUNCAN, M.D.

ANATOMY AND PHYSIOLOGY.



Position and Relative Size of the Heart.

The heart is a hollow muscular organ, situated near the middle of the chest, extending from the second to the fifth intercostal space, and from one inch to the right of the sternum (breast bone) nearly to the left nipple. It is about five inches long and four inches wide, and weighs from eleven to twelve ounces in men, and about two ounces less in women. It is large above (the base), and small below (the apex). A good idea of it may be obtained by examining the heart of a beef, which it resembles in shape.

The heart is contained in a sac, called the pericardium, and is divided by a partition into two parts—the right and left sides of the heart.

Each side is again divided into two parts or cavities. The smaller upper portion is the auricle, the larger lower portion the ventricle. The auricles have thin walls and merely receive the blood. The ventricles have thick muscular walls, which by their contractions force the blood out into the arteries, which divide and subdivide until they form a network of very minute

or microscopic vessels conveying this blood to all parts of the body, and thus supplying to them the nutrient elements of repair and growth. The final subdivisions of the arteries are called capillaries and are only one-three thousandth of an inch in diameter; some of them even less.

The capillaries open also into minute veins, which unite with each other and form larger veins, and these again to form still larger ones, and so on to one large vein called the vena cava, their function being to gather up the blood, with its impurities, from all parts and convey it to the heart, whence it is sent to the lungs for purification, preparatory to being again sent through the arteries.

The blood is carried by the vena cava to the right auricle; thence passes through the tricuspid valve into the right ventricle, then through the pulmonary valve into the pulmonary artery, which carries it to the lungs, where it is oxygenated. It is then carried through the pulmonary veins to the left auricle, next passes through the mitral valve into the left ventricle, then through the aortic valve into the great artery—the aorta—and the aorta and its branches again carry it to all parts of the body. Thus the heart is really a pump, its function being to force the blood through the arteries to all parts of the system, thence to be returned again through the veins to the heart.

In health, the heart beats about seventy times a minute, or about four times to each respiration, but this average is greatly modified during health by various influences, as exercise, age, excitement, etc. Thus, at birth the rate is 136; from two to seven, 97; fourteen to twenty-two, 76; twenty-eight to thirty-five, 70; fifty-five to sixty-three, 68; seventy-five to eighty-five, 71; and the average is from seven to ten beats faster in females than in males. These figures are general averages, and do not apply to all cases. Some people always have a more rapid rate, and some a slower one. The pulse is slower while the body is in a recumbent position by about six beats per minute.

Each beat sends a wave of blood through the arteries, just as each stroke of a pump sends a wave of water through a hose. This wave may be felt in any of the arteries which lie near the surface of the body, and is known as the pulse. So, by feeling the pulse we may determine how rapidly the heart is working, also how forcibly. The beating of the heart is an alternate contrac-

tion (systole), and expansion (diastole), the two making one beat. By listening to the heart two sounds can be heard. The first, long and dull, is caused by closure of the mitral and tricuspid valves, muscular contraction and the striking of the apex against the chest wall; the second, short and sharp, is produced by the closing of the aortic and pulmonary valves. These sounds are altered in diseased conditions of the heart.

Many constitutional diseases, as well as poisons, are spread through the body by means of the blood. Examples of these are hydrophobia, blood poisoning, diphtheria, syphilis, the poison from snake bites, and nearly all vegetable poisons.

The blood is composed of a fluid known as blood serum, and of red and white corpuscles, or cells. One of the principal constituents of the red cell is an albuminoid substance called hemoglobin. It owes its red color to the iron it contains. When much oxygen is united with it a bright scarlet red is shown, as in arterial blood, and when the hemoglobin has exchanged a part of its oxygen for carbon dioxide, it becomes a dark bluish red, as in venous blood. The red blood cells have an average diameter of about one-thirty-two hundredth of an inch, and are round discs with concave sides. The white cells are about one-fourth larger, and, like masses of jelly, change their shape to meet emergencies, thus passing through openings, much smaller than their own average diameter, in the walls of the capillaries, and finding their way between the cells composing the various tissues, to nourish them and assist in the formation of new ones to take the place of those worn out, and to repair wounds and injuries. They are also capable of absorbing or taking up and carrying away injurious debris, so their function is at least two-fold: That of repairing the waste that is constantly going on in the body, whether in sickness or in health; and that of carrying waste and injurious matter to the eliminating organs, the skin, lungs, liver and kidneys, to be thrown out of the system. It is also thought that they envelop any disease germs that chance to effect an entrance into the tissues, and that, when strong and healthy, they are able to destroy them by absorption, much as a jelly fish consumes its prey.

As the digested food products are absorbed by the villi (the microscopic ducts of the intestines), they are carried into the blood, and become a part of it, and these nutrients, together

with the oxygen obtained in the lungs, are thus, with the help of the heart, borne to every part of the body and there build new cells, or are consumed to furnish animal heat and energy.

The heart is one of the vital organs, its action being absolutely necessary to life. In the past it was regarded as the seat of life, including the mental and moral faculties now located in the brain. A survival of this idea, together with the present general knowledge of the heart, is responsible for the common belief that any affection of the heart is necessarily dangerous to life. We hear that a certain person has "neuralgia of the heart," or that some disease has "gone to the heart," and are gravely informed that the patient will now live but a few days; or, if by chance his life shall be spared, it can be for only a few uncertain years, with the fear of impending death haunting his every waking hour. Like many other popular ideas, this is erroneous. True, many persons do die suddenly from heart failure, but many of these cases are results of some acute disease, like diphtheria or pneumonia, and are not due to a disease of the heart.

The heart is subject to a number of diseases, some of which are not at all dangerous; others render the individual physically unsound for life; and a few so affect the heart that it may fail at any moment, thus constantly menacing the patient with sudden death. Even wounds of the heart are not always fatal.

It is not possible for the average person to treat diseases of the heart, or even to recognize many of them, but there are many people who desire to know what these diseases are, their manifestations and especially what their outcome will be. For the information of such individuals, rather than for the treatment of heart diseases, this chapter has been written. Then, too, there are some points in the treatment, especially in the diet, care and surroundings, that are practical and may be applied by anyone.

CONGENITAL DEFECTS.

Some infants are born with defects of the heart. The most frequent of these is a malformation, allowing the arterial and venous blood to mix, producing the so-called "blue child." The symptoms usually, though not always, appear soon after birth, the most striking of which is the blue color of the skin, due to an imperfect oxygenation of the blood in the lungs. The ends of the fingers are club-shaped; the breathing is always embarrassed; any exertion is impossible and development is prevented.

Half of these patients die before the end of the first two months of life, the great majority before sixteen months, and very few have been known to live thirty months.

PERICARDITIS.

Pericarditis is an inflammation of the pericardium or outer covering of the heart, and is almost always secondary to some other disease. Its most frequent cause is acute articular rheumatism (inflammatory rheumatism).

Other causes are scarlet fever, diphtheria, typhoid fever and Bright's disease. A few cases cannot be traced to any cause.

Symptoms.—Usually the first symptom is a sharp pain in the heart, but sometimes it is a chill. There is a feeling of discomfort in the region of the heart, and breathing becomes difficult; the temperature ranges from 101 degrees to 103 degrees; the pulse is rapid, and the patient restless. After a short time there is an effusion of serum into the pericardial sac, forming the so-called "water around the heart." This so interferes with the heart's action as to cause it to beat irregularly. There are other symptoms that can be detected only by a physician. The symptoms are not very marked; sometimes they are almost entirely absent. The diagnosis is seldom made, except by an experienced physician. In every case of acute articular rheumatism the heart should be closely watched.

Pericarditis runs a course of one to three weeks, occasionally longer, and relapse may occur, but the final outcome is recovery. If the pericardium becomes infected, from a wound or otherwise, and suppuration takes place a fatal result may be expected.

Treatment.—Put the patient to bed at once and apply a blister over the heart. Opiates are often necessary to relieve pain, and digitalis to steady the heart; but these drugs cannot be given in these cases, except by a physician. Digitalis, although one of the most generally useful drugs in all affections of the heart, is absolutely dangerous in unskilled hands.

If there is a large effusion into the sac, tapping by the surgeon will be necessary. The patient should be restricted to a liquid diet, such as milk and broths and soft boiled eggs, and kept perfectly quiet. He should not be allowed to rise suddenly from bed until out of all danger.

ENDOCARDITIS.

Endocarditis is an inflammation of the lining membrane of the heart.

The disease is usually confined to the valves; and is generally due to an invasion of the germs of some infectious disease, such as acute articular rheumatism, diphtheria, erysipelas, scarlet fever, measles, pneumonia, typhoid fever or small-pox. The old idea that "the disease went to the heart" was not very far from correct, though how it went was not understood. The majority of cases occur between the ages of five and fifteen years.

Symptoms.—Endocarditis usually occurs in the course of one of the above mentioned diseases. There are no distinctive symptoms noticeable by the ordinary observer, but the patient becomes worse, the breathing is more difficult and rapid, there is an increase of restlessness, and the temperature goes up a degree or two. A valve murmur may be heard by the practiced ear, and it is upon this that the diagnosis rests. Injury to one or more valves occurs, which may or may not be permanent.

The outlook as to life is good. Some cases recover completely, but many a patient gets up with a heart permanently damaged. The injury is to the valves, and constitutes a valvular disease, which will be mentioned later in this chapter. One attack is liable to be followed by another.

Treatment.—The principal treatment is absolute rest. Whenever any part of the body is diseased it should be allowed to rest. Although we cannot put the heart to rest, by placing the patient in bed and keeping him perfectly quiet, we can reduce the number of its beats by one-fourth.

Often nothing else is required. Indeed, drugs have very little effect.

The diet should consist of liquids and be easily digestible.

MALIGNANT ENDOCARDITIS.

This is a suppurative inflammation of the lining membrane of the heart and is a rare affection. It is characterized by chills and fever, as is the case in extensive suppuration in any part of the body. It occurs in connection with several of the infectious diseases, but most often with pneumonia, pleurisy, blood poisoning, puerperal fever, rheumatism and gonorrhea.

Symptoms.—Following, or occurring with one of the above

mentioned diseases, there are chills, fever and sweats, much resembling malaria; quinine, however, has no effect upon the temperature. Other symptoms are varied and not distinctive. Sometimes the disease resembles typhoid fever, and again blood poisoning.

Death always results, usually in five or six weeks, but life may be prolonged for months.

Treatment.—Treatment, of course, is useless, except to nourish the patient and prolong life as long as possible. Rest, stimulants and nourishing foods are indicated. Alcoholics may be given, also quinine in small doses. The evidently grave nature of the disease will preclude home treatment.

VALVULAR DISEASES OF THE HEART.

A valvular disease of the heart is a chronic affection of a valve following acute endocarditis. Valvular affections are of two kinds, known as obstructive and regurgitant.

In *obstructive* lesions the opening of the valve is narrowed, obstructing the flow of blood. Such an affection is called a *stenosis*.

In *regurgitant* lesions the valve is so weakened that it fails to close entirely and allows part of the blood to flow back, or regurgitate. Such an affection is called a *regurgitation* or an insufficiency.

Either or both of these conditions may be found in any of the four valves of the heart, and more than one valve may be affected at the same time. The valves in the left side of the heart are the ones most likely to be attacked, since the left side has the hardest work to perform. Lesions of the mitral valve are more frequent than those of the aortic, but not as serious. Any valvular disease places more work on the heart.

Symptoms.—These affections give few marked symptoms for some time, it may be for years. The increased work required of the heart causes it to enlarge, just as severe exercise enlarges the muscles of the blacksmith's arm. As long as the heart's power continues to increase in proportion with the growth of the disease it is said to compensate, and there are few symptoms. Sooner or later there comes a time when compensation fails and the heart dilates, its walls becoming thinner. The symptoms are then plain and danger is at hand. These symptoms of enlarge-

ment and dilatation will be described. There are some general symptoms, such as palpitation, getting out of breath easily, dizziness and dropsy, which should lead anyone experiencing them to have a careful examination by a competent physician. In these cases the sounds of the heart are so changed that the disease may be recognized by a trained ear.

The prospects of recovery cannot often be determined. Much depends upon the mode of life of the patient, whether it be quiet or subject to frequent changes, either physical or mental. Disease of the mitral valve often continues for an average lifetime. Recurring attacks (of endocarditis) make the outlook more grave. Death is usually preceded by dilatation with warning symptoms.

Aortic disease is a serious one. It is a condition in which sudden death is to be feared, yet the patient may live many years. Disease of the tricuspid valve is still more fatal, but it is extremely rare. The valve diseases in children are much more serious than in adults. The impression given out by some physicians that children outgrow valvular diseases is false.

Any serious acute disease, especially of the lungs, is more serious if the patient already has a valve lesion. But these are only general rules. The prognosis of each case rests upon the conditions in that case, and upon the subsequent mode of life.

Treatment.—Each case must be treated by itself and by a physician. A person with valvular disease should avoid over-exercise and excitement. He should not run, or walk rapidly, or climb stairs hurriedly. He should avoid extremes and passions of all kinds, especially fits of anger, and must lead an easy, quiet life, as free from sudden changes as possible, eating and sleeping regularly and avoiding exposure. When compensation fails medicinal treatment will be necessary.

HYPERTROPHY OR ENLARGEMENT OF THE HEART.

This is a condition in which there is an increase of the muscular tissue of the heart, bringing about an increase in size, thickness of the walls, weight, force and efficiency. The walls are the seat of enlargement, the cavities having their normal proportional size. The weight increases from the normal weight of 11.8 ounces to from twenty-five to fifty ounces. The cause of hypertrophy is usually valvular disease, but it may be Bright's disease, aneurism,

disease of the capillaries or liver. It may or may not be accompanied by dilatation.

Symptoms.—As long as enlargement keeps pace with the force required to pump the blood through the body the symptoms are few. After a time the increased force of the heart produces an increased blood pressure in the vessels. We then have hard, throbbing arteries, palpitation, dizziness, headache, ringing in the ears, flushing of the face and a tendency to nose-bleed. The pulse is bounding and may be seen throbbing in the neck, the heart beat being very forcible and plainly visible. The prospects for recovery in enlargement of the heart are those of the condition causing it. Of itself it is not a thing that threatens life.

Treatment.—There is no drug that will have any effect whatever. The cause only can be treated.

DILATATION.

Dilatation of the heart is a condition in which the cavities are enlarged, while the walls remain of normal thickness or, more often, are thinned. Usually there is also a fatty degeneration of the muscular fibers. The force of the heart is lessened. Dilatation is often the last stage of valvular disease, following hypertrophy. It may occur from any wasting disease, or from overexertion. In these cases it comes suddenly and death results quickly. Death from dilatation is the so-called "heart failure," that ends valvular disease. It is also seen in acute infectious diseases.

Sometimes a child with broncho-pneumonia or diphtheria or typhoid fever is past the danger point and well on the road to recovery, when he is unwisely allowed to get out of bed and walk about the room, resulting in sudden collapse and death from dilatation.

Heart failure is also a name that is used to cover many deaths, the cause of which is unknown. The heart gradually dilates and weakens, until sometimes it dilates past the point of contracting again, and life goes out. The process is usually slow, but may take place in a moment and from a very slight exertion.

Symptoms.—In acute cases there is sudden pain in the heart, shortness of breath, rapid, feeble pulse, collapse and death. In prolonged cases these symptoms appear, then disappear, to come again with renewed exertion.

There are general symptoms, such as dropsy, enlargement of the liver, short breath, congestion of the veins all over the body and fainting spells.

The result will be fatal. The only question is as to time. Dilatation means that the end is approaching.

Treatment.—In acute cases there is no time for treatment, and if there were it would be useless. In prolonged cases the treatment must be by a physician. The patient should avoid all exertion and excitement.

RUPTURE OF THE HEART.

Rupture of the heart is rare, but it sometimes occurs. It takes place only when the heart has been weakened by dilatation or degeneration, and is then subjected to strain. There is sudden pain in the heart, loss of breath, collapse and death. Obviously there is no treatment. This is another of the affections known as heart failure.

DEGENERATIONS.

These are conditions in which the muscular fibers of the heart degenerate into lower structures. Fatty degeneration is most common; others are fibroid, albuminoid, amyloid and calcareous degenerations. As these conditions are so difficult of diagnosis as to often be overlooked, even by competent physicians, it is useless to speak here of symptoms or treatment.

PALPITATION.

Palpitation of the heart is an unnatural, irregular or rapid beating of the heart, usually of nervous origin. The patient is painfully conscious of the palpitation, and often greatly alarmed. The disease is much more common in women than in men. It may be caused by anemia, indigestion, mental emotion, protracted illness, sexual excess, overwork, excitement or worry. Alcohol, tobacco, coffee or tea, in excess, may cause palpitation, especially in those of a nervous temperament. Cigarette smoking is a fruitful source of the disorder.

Symptoms.—The unnatural beating of the heart is the chief symptom.

This beating may be so rapid as to become a mere flutter, reaching a rate of two hundred per minute. The attack comes

without any apparent cause, lasts a few minutes, or, more rarely, a few hours, then passes away, leaving the heart normal until another attack. These paroxysms, at irregular intervals, may occur for years without serious harm. Accompanying them there is a "feeling of goneness"—weakness in the region of the stomach, and sometimes nausea. There are cases in which the only symptom is the occasional missing of a heart beat. The omitted beat may range from one in thirty to one in three. The patient notices it and is likely to be annoyed or alarmed by it.

An abnormally slow heart may be found in epilepsy, catalepsy, hysteria, and several other affections.

Treatment.—Rest and nourishing food are important elements in the treatment. Sedatives, such as potassium bromide in fifteen-grain doses three times a day, are useful in nervous cases. When the patient is weak and anemic the following is good:

Fowler's solution two drams.

Glycerole of iron four ounces.

Dose.—A teaspoonful after each meal.

The elixir of iron, quinine and strychnia, in doses of a dessert-spoonful three times a day, will help to build up weak patients. Outdoor exercise and everything that will improve the general health will tend to prevent the attacks. During the attack the patient should be kept quiet, lying down. Small doses of bromides (ten grains), digitalis (one drop), or aconite (one drop), are then useful, but not necessary. These cases furnish subjects for the hypnotist and "Christian Scientist."

ANGINA PECTORIS.

Angina Pectoris is an affection, characterized by severe pain in the heart, and a sensation of impending death. Its cause is valvular disease, hypertrophy or disease of the arteries of the heart (coronary arteries). It is seen only in persons past middle age, and most frequently in women. The attack is brought on by physical exertion or mental emotion.

Symptoms.—The principal symptom is pain, beginning in the heart and extending up into the neck and down the arms, especially the left arm.

With the pain there is a sensation of oppression in the heart, shortness of breath, and an uncontrollable feeling that death is

at hand. The skin is pale and beaded with perspiration, and there is an expression of anguish in the face, which once seen is not forgotten. The attack lasts from a few minutes to half an hour, when the patient either recovers or dies. Another attack may come in a few months, or not for years. Hysterical patients sometimes have attacks of hysteria closely resembling angina.

One-fourth of all cases die in the first attack. Others live a longer or shorter time, but some attack finally proves fatal. Any attack may be the last, but occasionally a patient lives to a moderately old age.

Treatment.—The attack should be treated with morphine (one-fourth grain hypodermically), or nitrite of amyl by inhalation. Chloroform is useful, and hot applications should be used over the heart. Between attacks the patient must avoid all exposure, hurry, exertion and excitement, being careful to lead a perfectly quiet life and to eat no indigestible food. He should, however, take moderate exercise. Medicinal treatment, with a view to keeping off the attacks, may be given by a physician. It is well for the patient to carry the small pearls of nitrite of amyl—kept by druggists. The pearl should be crushed in the handkerchief, and the nitrite immediately inhaled at the beginning of an attack.

DISEASES OF THE BLOOD AND VESSELS.—ANEURISM.

Sometimes when the walls of an artery are diseased and subjected to a strain they give way without entirely rupturing, forming a bulb or sac in the course of the artery. This is called an aneurism. The same condition in a vein is called a varix, and the vein is said to be varicosed.

The most common cause is the one just mentioned, a strain in a vessel already weakened by disease, but a violent strain may produce aneurism in a vessel previously sound. Any of the large arteries may be thus affected.

Symptoms.—The symptoms vary with the location of the aneurism, and are not plain to the ordinary observer.

Prognosis.—Aneurism of the aorta is fatal sooner or later, from perforation of the walls and hemorrhage. Aneurism of the arteries of the brain often gives way, causing cerebral hemorrhage (apoplexy). Aneurism of the other arteries may not shorten life.

Treatment.—The treatment must be by the surgeon. The

only drug reputed to have any effect whatever is iodide of potassium.

VARICOSE VEINS.

Varicose veins are veins that have enlargements or dilated portions.

They are usually the superficial veins of the lower extremities, or the spermatic veins. They indicate a weak heart action, sluggish circulation, or lack of tone in the vessel walls.

Treatment.—There are two ways of treating varicose veins. One is the palliative method. As its name implies, it is temporizing and palliative, not curative, and consists of the application of bandages, silk or elastic stockings, etc. It may slightly relieve the condition, but does not cure it. The other method is surgical, and consists of simply cutting down to the dilated vein and tying it at several points, or removing it entirely. This operation is very easily performed, is not dangerous, and puts an end to the varicose vein. By the aid of cocaine, it may be done without even giving an anesthetic.

ARTERIO SCLEROSIS.

This is a disease of the arteries in which there is first an inflammation, then the formation of alternate soft and hard spots in the vessel wall. The hard parts destroy elasticity, thus interfering with circulation; the soft parts give rise to aneurism, or rupture and hemorrhage. The caliber may be much diminished by thickening of the walls, and the vessel may be closed entirely by clots. In some cases the artery becomes a solid rod, shutting off all circulation and leading to gangrene. Arterio sclerosis is a disease of those past middle life, and is found more frequently in men. It is often hereditary. Some of the exciting causes are gout, rheumatism, lead poisoning, alcohol, syphilis and the overexertion of athletes and acrobats.

Symptoms.—In superficial arteries the disease may be detected by the dilated, hard, often bony feel of the vessel. It is difficult to compress, and rolls under the finger like a cord. Often the alternate hard and soft rings may be felt, giving the same sensation as the windpipe felt in the neck of a small animal. It is frequently accompanied by hypertrophy of the left side of the heart. Cerebral apoplexy, pulmonary congestion, angina, varicose ulcers and gangrene of the lower extremities are some of the serious complications directly resulting from this disease.

The prognosis is grave. If the disease is of syphilitic or gouty origin, treatment often produces good results; otherwise a fatal termination may be expected, though it be postponed for years.

Treatment.—The only drug having any effect upon this disease is iodide of potash, which should be given three times a day. It is well to begin with ten grains at a dose and gradually increase. Fifty, or even one hundred grains, three times a day can thus be given after a little with safety. The patient should live a quiet life, free from excitement and excesses of every kind. Any sudden exertion may lead to a fatal central hemorrhage. The first thing should be to find the cause—gout, syphilis, or whatever it may be—then to treat that cause appropriately. Many cases reach a very serious condition before being recognized. Indeed, many are never recognized.

ANEMIA.

Anemia is a condition in which either the quantity or quality of the blood is materially below the normal. Of course, anemia follows a large hemorrhage. It also occurs in the later stages of wasting diseases, such as consumption, cancer and diabetes. These are only symptoms or results of other conditions and will not be described here, being treated elsewhere in this work. Anemia, as here referred to, is a certain disease known by physicians as pernicious anemia. Chlorosis is also an anemia, but will be treated separately.

The cause can seldom be found. The disease is most frequent in the old, although no age is exempt from it. Men are more often affected than women, but pregnant women seem quite susceptible. Fortunately it is a rare disease.

Symptoms.—The disease begins as a weakness, weariness or languor, which gradually increases to such extreme debility that any exertion causes faintness. Finally the patient takes to his bed and is unable to rise.

Both body and mind are torpid. The lips, gums and conjunctiva are pale, while the skin is a faintly yellowish or greenish white. Contrary to what might be supposed there is no emaciation, and very little weight is lost.

Digestion is interrupted, and often there is nausea, vomiting and diarrhea. The principal change in the blood is not in the amount of blood, but in the decrease of red-blood cells. The

number may be reduced to one-fourth, one-tenth, or even one-twentieth of the healthy number. The amount of hemoglobin in each cell is not diminished.

The prognosis is serious. Some cases improve under proper treatment, and recoveries do take place, but they are the exceptions.

Treatment.—Put the patient to bed and in place of exercise give massage. Good nourishing food and hygienic surroundings favor recovery. Beef juice, liquid peptonoids and peptonized milk are excellent foods. Of medicines, arsenic is the most useful. It is best given in the form of Fowler's solution, three times a day, beginning with five drops at a dose and increasing to twenty or thirty. This should be kept up for months. Iron should also be given, but its use is not as important as that of arsenic.

Wyeth's glycerole of iron, Parke, Davis & Co.'s syrup of the chloride of iron, and Gude's "Pepto-mangan" are excellent preparations.

CHLOROSIS. GREEN SICKNESS.

Chlorosis is an anemia met with in young women between puberty and twenty-four years of age, and it seldom occurs in anyone else. It is more common in blondes than in brunettes, and in the delicate than in the vigorous. Girls who menstruate early are most subject to it. Confinement, lack of exercise and continued emotional excitement are factors of its cause.

Symptoms.—The patient, who is nearly always a girl between the ages of sixteen and twenty, is weak and easily gets out of breath. The lips are pale and the skin has a yellowish or greenish pallor. Vertigo and palpitation of the heart are common. Menstruation is apt to be irregular, the patient missing periods. Some cases resemble the decline of consumption, but there is no cough. The blood is materially altered. The number of red-blood cells is reduced, but not as much as in pernicious anemia. The hemoglobin is usually reduced by one-half or more. The shape of the red cells is also changed.

The prognosis, under proper treatment, is favorable. Restoration to normal health may always be expected, but time—weeks or months—may be required. The disease should not be allowed to go on very long. In such cases development is interrupted and permanent depraved conditions of health established.

Treatment.—The patient should be put to bed and given plenty of nourishing food. Massage is a useful measure. A change of scene is beneficial, especially if it be to the seaside. Iron has an almost miraculous effect upon chlorosis. It should be given in small doses as directed for anemia.

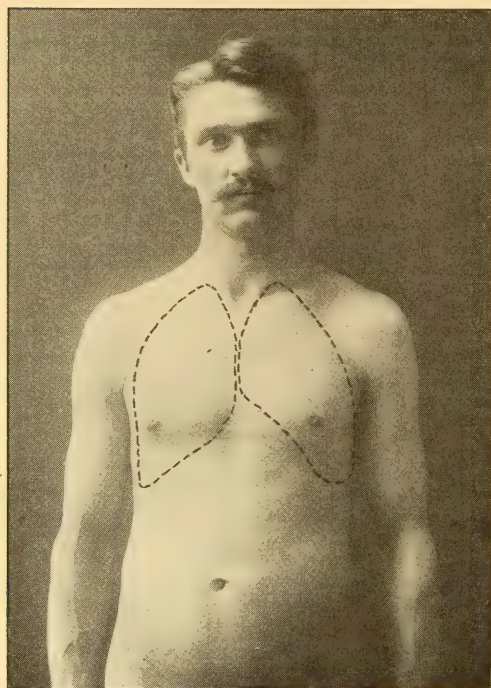
Arsenic is less useful, but should also be given, in the form of Fowler's solution, five drops three times a day, and gradually increase the dose to fifteen or twenty drops.

CHAPTER VI.

DISEASES OF THE LUNGS.

By LOUIS C. DUNCAN, M.D.

The two lungs, one on each side of the chest, are covered by a smooth, serous membrane, the pleura, which also lines the inner walls of the



Position and Relative Size of the Lungs.

chest, providing smooth surfaces to avoid friction in the movements of the lungs in breathing. These two surfaces, the outer surface of the lungs and the inner surface of the chest wall, are usually in contact, leaving no vacant space; but they may be separated to form a vacancy known as the pleural cavity. Between the lungs is the heart, and below them the diaphragm or midriff. The structure of the lungs is very delicate and complicated. To study it we begin at the trachea (windpipe).

The trachea is composed of rings of cartilage, which keep it open. It extends down the middle of the neck and about four inches into the chest, where it divides into two branches known as the bronchi, which are similar to the trachea and divide and subdivide until their branches are too small to be seen with the naked eye. These small tubes are known as small bronchi, bronchioles, or capillary bronchi; each of the smallest terminating in a sac whose thin

elastic walls are pouched outward into little pockets called air vesicles, or air cells, having a diameter of but $\frac{1}{140}$ of an inch, and walls $\frac{1}{2500}$ of an inch in thickness, between and around which is a capillary network of blood vessels. Here the venous is changed into arterial blood by discharging carbonic dioxide and absorbing oxygen in its stead. This exchange is probably facilitated rather than hindered by the extremely delicate membrane separating the air from the blood. The caliber of the capillaries is only a little greater than the diameter of a blood corpuscle, but they are so numerous as to constantly contain about four pints of blood.

The lungs are estimated to contain about 725 millions of the air cells above described, with a total respiratory surface more than 100 times greater than the external surface of the body. Respiration or breathing consists of the alternate expansion and contraction of the chest by means of which air is drawn into and forced out of the lungs. Drawing air into the lungs is called inspiration, and expelling it from them expiration. The chief agent in breathing is the diaphragm, which is aided by the muscles of the chest. The movements of normal respiration take place from fifteen to eighteen times per minute, but disease, especially lung disease, greatly quickens them. The volume of air taken into the lungs and given out at each quiet normal respiration, by the average adult, is about 30 cubic inches, and is called tidal air. After each normal inspiration, from 100 to 130 cubic inches can be forcibly inspired, and after each normal expiration about 100 cubic inches can be forcibly expelled, but after the most forcible expiration there always remain in the lungs from 100 to 130 cubic inches, called residual air. From this it will be seen that only a small part of the air in the lungs is subject to renewal at each inspiration, and that by forced inspiration the lungs may contain about 330 cubic inches.

“It is important to remember that the lungs, even after the deepest expiration, always contain a large amount of air. In this way the diffusion of gases, between the air in the lungs and the blood gases, can go on continuously, with increase of the process at every inspiration. The vital capacity, the amount of air that can be forcibly expelled from the lungs by the average man of ordinary height, is 230 cubic inches, this capacity being greatest at about 35 years of age.” (Landois and Sterling.)

Sighing consists of a prolonged and almost noiseless inspiration, followed by a sudden, noisy expiration.

In *hiccough* there is a spasmodic contraction of the diaphragm, causing a sudden inspiration, with a peculiar sound as the air rushes through the larynx.

Coughing is a complex process: First there is a contraction of the diaphragm as if for expiration, but the larynx is closed; then, as the other muscles aid the diaphragm and the pressure becomes great, the larynx opens suddenly and the air is forced out with an explosive sound.

Sneezing is like coughing, except that the air is forced out through the nose instead of the mouth.

Function.—As already implied, the function of breathing is to supply the blood with oxygen, and carry from it carbon dioxide. The 30 cubic inches of pure air inspired at each breath contain about 21 parts, in every 100, of oxygen and a mere trace of carbon dioxide, but that which is expired has only 16 parts of oxygen, and contains $4\frac{1}{2}$ parts of carbon dioxide. The oxygen is necessary to life; the carbon dioxide is poisonous. A large quantity of water and some animal matter is also thrown out with the expired air.

BRONCHITIS.

(Cold in the Chest. Cold on the Lungs.)

Bronchitis is an inflammation of the membrane lining the bronchial tubes. It is limited to the larger tubes and affects both lungs. Its principal cause is chilling of the body (taking cold). It may follow a cold in the head or throat. It is rare in the summer and autumn; most frequent in the late winter and early spring. It may accompany measles or la grippe.

Symptoms.—There is a feeling of weight, soreness or tightness in the chest, with continued coughing. The cough is hard and dry in the beginning, gradually becoming looser. With the dry cough there is little expectoration, but when it loosens the patient spits a yellow mucus. There is only slight fever (100 degrees to 101 degrees). The disease usually lasts but six or eight days, but in the weak, debilitated and aged it may last several weeks. Some cases become chronic. There is seldom interference with the breathing, except in children, and there are no sharp local pains.

In infants bronchitis may lead to pneumonia with fatal

results. In adults the prospects as to life are absolutely good. The worst that can happen is the disease may become chronic. Bronchitis does not tend, as some people think, to consumption.

Treatment.—If possible, the patient should be put to bed. If this can be done, no other treatment is necessary, but many wish to keep up, or even to attend to their business, and for these medical treatment is needed. An application of mustard or turpentine to the chest will, in many cases, effect a cure. Care should be used not to blister. One of the best medicinal remedies is the citrate of potash. A tablespoonful of the solution should be given every two hours. Sweet spirits of niter, thirty drops every three hours, will promote perspiration and loosen the cough.

If the cough is very harassing, give the following: Syrup of white pine compound, four ounces; codeine, eight grains; shake thoroughly and give a teaspoonful every hour until the cough is relieved.

If the cough does not loosen readily and an expectorant is wanted, give a teaspoonful every three hours of the following: Chloride of ammonia, two drams; syrup of wild cherry, three ounces.

Do not put a poultice upon the chest. Hot drinks and a hot footbath just before retiring are old and meritorious measures.

CHRONIC BRONCHITIS.

When bronchitis continues for several weeks it is said to be chronic.

Chronic bronchitis may be caused by a succession of colds, or, it may be, by an extension of acute bronchitis. It also follows measles, la grippe and pneumonia. Other causes are valvular disease of the heart and chronic Bright's disease.

Symptoms.—The most prominent symptom is the cough. There is more or less coughing at all times, but there are spells of continuous coughing, caused by an accumulation in the bronchial tubes. These spells usually come on in the morning, but may come in the night or at any time. There is considerable expectoration of a thick, stringy, yellowish substance said to be muco-purulent—a mixture of mucus and pus. It often contains greenish masses. In some cases there is hardly any expectoration. Usually there is no fever, and there is but slight interference with

the breathing. The appetite remains good, and there is but little loss of weight. In old persons the symptoms almost disappear in summer, but come on again each winter.

The prognosis is favorable as to life, but unfavorable as to recovery.

Long-continued cases are frequently complicated with asthma. In the aged the disease may prove fatal.

Treatment.—The patient should be warmly clothed, with wool next the skin, and should take particular care to keep the feet warm and dry. Every cold makes the condition worse. If, in the early stages, the patient can go to a warm climate, he will recover without any other treatment. Of medicinal remedies, perhaps the best is creosote. At first one drop of it should be given three times a day, then the dose should be slowly increased to five drops. It may be given in pill form, or in red wine well diluted. Inhalations of the vapor are often useful. Place a few drops of creosote in a cup of water, heat over an alcohol lamp and inhale the vapor. Atomizers do no good. If an expectorant is needed give a teaspoonful every four hours of the following: Carbonate of ammonia, three drams; syrup of tolu, four ounces.

Strychnia is useful in all cases. Begin with one-sixtieth of a grain and very gradually increase to a twentieth of a grain three times a day.

Quinine, in small doses, and cod liver oil are excellent remedies. The climates suitable to one with chronic bronchitis are those of Georgia, Florida, New Mexico and the coasts of the Mediterranean.

ASTHMA.

(Bronchial Asthma.)

Bronchial asthma is a disease of the bronchial tubes characterized by attacks of labored and difficult breathing. There is a temporary, spasmodic contraction of the tubes that causes gasping for breath. The cause of this contraction is not known. The disease is frequent in children, more frequent in men than in women, and those of a nervous temperament are more prone to it. An attack may be brought on by exposure, taking cold, overexertion, indigestion and similar causes, and although it may come at any time it is most frequent in the evening.

Symptoms.—The patient can get his breath only with diffi-

culty, the amount of this difficulty depending upon the severity of the attack. His face is pale and anxious, or it may be bloodshot. The inspiration is long drawn and the patient seems unable to get enough air into the lungs, but often he has even greater difficulty in expelling it; and there is a whistling, wheezing sound as it passes in and out. The patient makes violent muscular exertions to breathe; the muscles of the neck and chest are contracted and the abdominal muscles are hard; his chest moves but slightly; he sits upright, or leans a little forward, and seems to be suffocating, but in spite of all his efforts the breathing is not accelerated. All the phenomena are very distressing to behold. The attack lasts from one to three or four hours, and may terminate with a fit of coughing, but coughing is not a prominent symptom and often does not occur. The patient soon learns to recognize the coming of an attack. Between the attacks the health is likely to be good. Asthma is very distressing, but not fatal. Some cases grow worse with age; others improve, then entirely recover. A cure is possible in many cases.

Treatment During the Attacks.—The patient should carry pearls of nitrite of amyl, and when the attack comes crush one in a handkerchief and inhale the drug.

A quarter of a grain of morphine, hypodermically administered, is the best remedy, but it involves the danger of causing "the morphine habit" if often repeated. Chloroform or ether may be used by inhalation.

Most of the patent asthma cures contain niter and stramonium leaves.

Anyone can prepare them. Add all the saltpeter to a pint of water that it will dissolve. In this solution soak strips of common blotting paper, then dry them thoroughly. Burn these on a dish covered by a large paper cone, and inhale the vapor. It very often gives great relief. It may be improved by adding the dried leaves of the stramonium datura (common jimson weed or thorn apple).

Treatment Between the Attacks.—When the cause is undiscoverable, as it frequently is, one of the following may be given:

Tincture grindelia robusta.....	three ounces.
Tincture convallaria	one ounce.
Water	nine ounces.
Mix and give a teaspoonful three times a day.	

Tincture grindelia robustathree drams.
Tincture belladonnatwo drams.
Iodide of potash.....five drams.
Waterenough to make four ounces.
Mix and give a teaspoonful three times a day.

The patient should wear warm clothing, keep his feet dry and avoid exposure and taking cold. Cold and moist climates and high altitudes are generally harmful. Low altitudes and warm, dry climates are best suited to asthmatics. Lower California and Egypt are ideal places for those thus afflicted.

PNEUMONIA.

There are two varieties of pneumonia, broncho-pneumonia, a disease of infants, and the ordinary pneumonia, seen both in children and adults. The latter is variously known as pneumonia, pneumonic fever, lung fever, lobar pneumonia, fibrinous pneumonia and croupous pneumonia. We will here speak of it simply as pneumonia or croupous pneumonia.

It is an acute, infectious inflammation of the lungs, affecting the lung tissue proper as well as the air vesicles and bronchial tubes. It is usually confined to one lung. There is no longer any doubt that its cause is a specific germ, the bacillus lanceolatus, discovered by Surgeon-General Sternberg of the United States army in 1880. It enters the lungs with the breath, is frequently found in the mouths of healthy people and may be introduced into the lungs of such persons without injury, for if one be in good health and in no way weakened or lacking in vitality the germ, on entering the lungs, is destroyed. But when the body is exhausted by fatigue or chilled by cold, or its vitality is in any way materially lessened, even for a short time, the lungs seem to have no power to resist or throw out the germs, hence, finding lodgment there, they multiply at a marvelous rate and produce pneumonia.

That cold is an important factor in bringing on the disease is shown by the fact that most cases occur in the winter or early spring. It is usually seen in but single cases, but pneumonia epidemics sometimes occur. One attack does not prevent another, but renders its victim more susceptible to future attacks. The robust and vigorous seem to be more subject to it than the weakly and delicate, but probably this is because they are less careful about

exposure and fatigue. Children of from three to ten years seem to be favorite subjects of attack, for it occurs oftener in them than those of any other age, although it is quite common in the old and feeble. The lower lobes of the lungs are most often affected and the right one more frequently than the left. It may be interesting in this connection to notice that consumption usually begins in the apex of the left lung, and that bronchitis affects both lungs.

Symptoms.—An attack of pneumonia is divided into three stages, depending upon the condition in the lungs and the external symptoms.

The Stage of Congestion is the first, and lasts about twenty-four hours. The very minute blood vessels surrounding the air vesicles are overfilled with blood and there is some exudation of blood into the vesicles themselves. This stage almost invariably begins with a severe chill, though in children it may begin with vomiting or convulsions. There may or may not be headache and a feeling of discomfort a day or two before the chill.

Following the chill there is high fever—103 degrees to 105 degrees—and the pulse is full and strong, with from 100 to 120 beats per minute. The respiration is from 40 to 60 per minute—a rate more rapid than in most other diseases. The face is flushed, the cheeks red and the eyes bright. Very soon in the side of the chest there is severe pain, aggravated by deep breathing, and there is a cough, dry and hard at first, but becoming looser, with expectoration in the later stages.

The Stage of Consolidation comes next and is sometimes called the stage of red hepatization. The air vesicles and finer bronchial tubes are so filled with cells, serum and a tenacious substance, known as fibrin, that the part becomes a solid mass. The lobe affected is said to be solidified, and has the appearance of a piece of liver—hence the name, hepatization. The lung tissue is swollen and inflamed, but in this stage the cough is looser and there is the typical expectoration of pneumonia—a sticky, reddish or brownish-red mucus known as “brick-dust” or rusty expectoration.

In some grave cases the sputum is watery and dark purple in color, resembling prune juice, and known as “prune juice expectoration.” The rusty sputum generally appears in from one to three days after the attack, but may not come until the tenth

day, or even later, and then be only small in amount. In rare cases it does not occur at all. (In old persons the temperature may be but little above normal and the respirations but from 24 to 30 per minute.)

The other symptoms continue, the rapid breathing becomes labored and the temperature remains high. This stage lasts from four to nine days and ends in a crisis; that is, the temperature suddenly falls to normal and the patient seems much better.

Stage of Resolution, or Gray Hepatization. This is the stage of recovery, or death. The substance in the air vesicles is softened and in the cases that recover is absorbed, but in those that are fatal it becomes purulent. The temperature should fall to normal, or below, and there should be free perspiration, the breathing becoming easier and the patient seeming better in every way.

From this time recovery is rapid, and in from four to six days should be complete.

But the cases do not all run such a typical course. The stages often merge into each other, and two stages may be present at the same time. The temperature and rate of breathing are highest in children. In aged people many prominent symptoms are absent. Fever sores (herpes labialis) on the lips are common. In some cases there are typhoid symptoms with delirium.

When a case goes on to death, the breathing grows faster and more difficult, until the patient literally gasps for air; expectoration is scanty or entirely lacking; the face is first blue, then pale; the skin grows cold and clammy, and the strength fails rapidly; there is loss of consciousness, and often there is low delirium. Death takes place from heart failure, or by suffocation from filling up of the lungs. The fatal case usually runs its course in less than ten days.

Complications.—The complications are empyema, abscess of the lung, gangrene, consumption, pleurisy, endocarditis and pericarditis.

One case in every five dies, even with the best treatment, and in the aged and intemperate the percentage of deaths is yet greater. Children usually recover, even when desperately ill, the mortality rate in those under five years of age being less than one in twenty. The young and vigorous adult, with seemingly mild symptoms, sometimes dies suddenly. The prospect depends somewhat upon the amount of lung tissue involved; the order of

gravity being one lobe, two lobes, both lungs and the whole of both lungs. In the latter case death is the invariable result. Most cases end definitely, either in complete recovery or in death.

Treatment.—As yet there is no specific cure for pneumonia. The disease usually runs its course and cannot be “broken up” or shortened by drugs. The object of treatment, then, is to lessen the intensity of the disease, stimulate the patient until the crisis is past, stimulate the lungs and heart when necessary, nourish and nurse the patient, and treat other symptoms or complications as they arise.

Fifty years ago bleeding was always the practice in pneumonia, but it has been entirely abandoned and the death rate, as shown by reliable statistics, is no greater. Instead of blood-letting, which is weakening, the foundation of the present treatment of pneumonia is nourishment and stimulants. The patient should have plenty of good, easily digestible food.

A suitable diet is one and a half to two pints of milk, two or three eggs, and meat broths each day. Alcoholic stimulants are needed almost from the first. There is hardly any other disease in which they are so useful. A half-ounce of whisky or brandy may be given every three to six hours, and, for a short time, it may be given oftener than that. About the time of the crisis strychnia is needed. In weak patients it may be needed throughout the whole course of the disease. One-fortieth of a grain may be given every four hours.

To relieve the pain, codeine, in one-half grain doses every four hours, is good. Poultices should not be used upon the chest, for they do harm instead of good. An application of well-diluted turpentine is often useful.

Expectorants are not needed until the stage of resolution arrives. During that period five grains each of ammonia carbonate and iodide of potassium may be given every three hours. The fever in pneumonia is not dangerous in itself, but when a temperature of 104 is reached it should be reduced by sponging with tepid water. The room in which the patient is kept should be well ventilated both day and night. Lack of sufficient oxygen in the blood is a feature of the disease, and it should be supplied as freely as possible. In the large cities oxygen is used as part of the treatment, and with excellent results.

BRONCHO-PNEUMONIA.

Broncho-pneumonia is an inflammation of several small areas, or parts, of the lungs, and is practically the same disease as capillary bronchitis.

Although almost entirely a disease of children, and, in the great majority of cases, occurs in those of less than three years, it is also found in old age. It is not caused by any one class of germs or microbes. It may occur as a separate disease, but it very often follows one of the infectious diseases, especially measles, diphtheria or whooping cough.

It also, though rarely, follows scarlet fever, typhoid fever and bronchitis. In the aged it may follow la grippe, typhoid fever or Bright's disease. Like croupous pneumonia, it is a disease of winter and spring. It can hardly be called contagious, though we occasionally see two cases in one family.

Symptoms.—The symptoms are not well marked and plain like those of croupous pneumonia. In the course of, or during convalescence from measles, diphtheria or whooping cough, there arises a cough, with fever from 101 degrees to 103 degrees, and the breathing becomes very rapid. This rapidity of breathing is a diagnostic symptom. It may range from 60 to 100 per minute, and the lack of sufficient air in the lungs is very apparent and distressing.

The cough is continuous and painful, but there is no expectoration.

There is great weakness, which increases to profound prostration, and the face becomes purple (cyanosis) from lack of sufficient oxygen in the blood. Death may occur in less than twenty-four hours, but usually the symptoms continue from one to three weeks, then disappear gradually, not suddenly, as in croupous pneumonia. The temperature varies considerably, frequently reaching 104 degrees or 105 degrees. Since the temperature of all diseases goes higher in children than in adults, a high fever in a child in such cases is not of as grave import as it would be in an adult. The diagnostic symptoms are: Acute onset, continued high fever, very rapid breathing, prostration and cyanosis. Death comes from heart failure.

Broncho-pneumonia is a serious and treacherous disease. In hospital practice the mortality is from 30 to 50 per cent. In private practice better results are obtained, but even here from

10 to 25 per cent of those who take the disease diè. The younger the child the greater the danger, but a case, in which the fever is high and the child seems desperately sick, frequently recovers. On the other hand, those with a low but fluctuating temperature and seemingly mild symptoms may die suddenly. There is no other disease in which the outlook is so uncertain and the fate of the patient seemingly so subject to caprice as this form of pneumonia. One attack does not prevent another.

Treatment.—As in croupous pneumonia, the foundation of the treatment is nourishment and stimulants. The disease runs a certain course and we must maintain the bodily strength until the dangerous period is past and reaction comes.

The entire trunk, back and all, from neck to navel, should be wrapped in cotton batting and covered by a closely fitting jacket of oiled silk or oiled linen, and it should be worn until recovery. This is much better than heavy poultices, which impede the already difficult breathing. If a counter-irritant is wanted, and it often is, apply to the chest a paste of one part of mustard to six parts of flour or meal, or a cloth wrung from hot water containing a little turpentine. Although the *modus operandi* of these things is not exactly known, all agree that they do good.

In children all expectorants, emetics, and such things as squills, ipecac and antimony are far better omitted. Their only effect is to disturb the stomach. Stimulate from the beginning, for which purpose whisky or brandy is preferable; from one-half an ounce to two ounces of either one may be given daily to a child one year old. Dilute with eight parts of water. Strychnia is necessary when there is great prostration. A child one year old should have one-two hundred and fiftieth of a grain every four hours. These stimulants are most needed when the temperature is low or falls suddenly. More of each may be given for a short time, and, of course, a larger dose to an older child.

For the fever do not give any of the antipyretics, as antipyrin, acetanilid, phenacetin, or even quinine. They do no good in these cases and often do harm. High fever is not as serious a thing in a child as in an adult. Not until the temperature reaches 105 degrees is there occasion for treatment of the fever. Then take equal parts of alcohol and water (temperature 80 to 85) and sponge the whole body from ten to twenty minutes. This will reduce the temperature and quiet the restless child more safely than any

or all drugs known. If the temperature is very high it may be reduced by frequent sponging with water as hot as can be borne. It may also be reduced by a cold pack, or a cold bath. While both methods have their advocates, it is thought by many that the hot water is the better and safer agent.

The cough is best treated by inhalations of creosote vapor. These may be taken by placing a small sponge at the end of the spout of an ordinary teakettle, in which there is water hot enough to produce a little steam, dropping a few drops of creosote on the sponge, then allowing the child to inhale the steam as it comes through the sponge, care being taken that the steam shall not be too hot.

Do not give many drugs. They are not needed. There is great danger, in any disease, of giving a child too much rather than too little medicine.

CONSUMPTION.

Consumption of the Lungs. Tuberculosis of the Lungs. Pulmonary Consumption. Phthisis. Pulmonary Phthisis.

Consumption of the lungs is an infectious disease due to the lodgment in the lung of a specific germ, the bacillus tuberculosis. The disease is characterized by the formation of tubercles in the lungs, the destruction of lung tissue and a general wasting of the body. It is so widespread and fatal that in the temperate zone one-tenth of the entire population dies of it. In the torrid and frigid zones it is almost unknown.

It is an established fact that the cause of consumption is the bacillus tuberculosis, a minute vegetable germ discovered by Koch in 1882. The disease tuberculosis, which it produces, attacks any and all parts of the body, consumption, or tuberculosis of the lungs, being but one form of the disease. The germ enters the body in one of two ways. In by far the greater number of cases it is inhaled with the air. Tubercular patients spit upon floors, walks, and elsewhere, and as the sputum dries the germs are blown about in the air as dust. In some cases it enters the stomach in the milk of cows affected with tuberculosis.

If these statements are true, the question at once arises: "Why do not all people have tuberculosis?" In every community there are patients spreading the germs all the time, and it would seem miraculous that any of us escape. While the germ is the

real cause of the disease, there are many factors that go to make for it a suitable lodging place in the lungs. It was only the seed sown on good ground that "brought forth fruit, some an hundred-fold, some sixtyfold, some thirtyfold." So with the germ, which may be considered the seed of tuberculosis. When it enters the lung of a person who is strong and vigorous, and has no tendency to the disease, it is destroyed; but when it enters the lung of a person susceptible, it finds a suitable soil, remains, multiplies at a marvelous rate, and produces the disease.

The factors which make up the tendency to consumption will now be given in the order of their importance.

(1) Heredity, by which we mean a weak or peculiar cell structure, transmitted from parent to child. Its influence in this disease has long been recognized, and is more potent when both parents are affected. If but one parent has the disease the children most resembling that parent are more liable to it. Very many cases are not hereditary.

(2) Age.—This has much to do with liability. Although no age is exempt, nearly all cases occur between puberty and thirty, and most cases occur between the ages of eighteen and twenty-five. It is likely to appear a year or two earlier in women than in men.

(3) A delicate constitution favors the lodgment and multiplication of the germs.

(4) Cold and damp localities and climates subject to sudden change show more cases than those with the opposite conditions.

(5) Insufficient nourishment.

(6) Persons with poorly developed lungs, as shown by narrow or flat chests, are good subjects.

(7) Race.—No race is exempt, but the colored race and the American Indian are peculiarly susceptible.

(8) Chronic bronchitis.

(9) Sex.—Women are more susceptible than men.

(10) Exposure to cold and wet.

(11) Measles and other infectious diseases of that class.

(12) Occupation.—All confining or indoor occupations exert a tendency to bring on the disease in those having hereditary or other tendency; and work attended by irritating dust is also a factor, as the work of masons, miners and metal polishers.

Except to those having a tendency to the disease, houses that

have been occupied by consumptives are not specially dangerous. A person knowing himself to be liable to the disease should not live in such a house until after it has been thoroughly disinfected, and it is wise to take this precaution in any case. Burning a little sulphur in a room is not all that is needed. (See department on Disinfection.)

The disease may be directly communicated from one to another, but this is rare. A person of a consumptive tendency should not nurse a consumptive patient.

Symptoms. — Consumption commonly begins with a short, dry, hacking cough, which is most noticeable on going to bed at night, and just after rising in the morning. At first the cough is irritating and there is no expectoration. A peculiar sallow, or grayish, pallid complexion is early noticeable.

This is often seen, in persons having the hereditary tendency, before the disease appears, and the doctor is able to say that such a person will have consumption. There is a loss of strength and weight, but the patient remains in good spirits; yet, because of a tired feeling, he does not like to rise early in the morning. He is easily fatigued, and feels unequal to his usual work.

Very early the pulse is quickened to 100, or more, and there is fever in the afternoon and evening, the temperature rising gradually till evening, when it reaches 101 degrees to 103 degrees, then falling to normal during the night.

When the fever is highest the eyes are bright, and the cheeks are flushed. The patient takes cold easily, and each attack is more severe. Very frequently there are attacks of pleuritic pain in the side of the chest.

The weight steadily decreases, and the loss of flesh becomes noticeable. The bones are prominent and the cushions of fat on the ends of the fingers disappear. The cough, which was dry, becomes looser, and there is expectoration, which becomes more and more plentiful. At first it is frothy, then muco-purulent; frequently streaked with blood. In about half the cases there is spitting of blood. Hemorrhage from the lungs may occur at any time. Digestion is usually deranged, diarrhea is frequent in the later stages, and, as the disease progresses, the cough becomes more frequent and harassing. The sleep is broken and unrefreshing, the appetite fails, the patient grows weaker and weaker, and diarrhea increases the general weakness. He gets out of breath

very easily and, in some cases, there are alarming attacks of dyspnea, in which he literally gasps for air. Yet through all he remains cheerful and hopeful. There are periods of temporary improvement, in which he feels so much better that even the friends may hope for recovery. In the last stages the cough is continuous, the appetite gone, the body wasted to a skeleton, the breathing very rapid and shallow, and the lower limbs swollen and painful.

Death may come unexpectedly, while the patient is feeling better than usual, or after a gradual decline of a day or two. It is usually peaceful.

Prognosis.—If the disease be early recognized and the patient removes to a suitable climate, observes hygienic rules and pursues a vigorous course of treatment, recovery is possible; otherwise, the best that can be hoped for is to delay as long as may be the fatal termination. If treatment be given a person having a tendency to consumption, but in whom it has not yet appeared, the disease may usually be prevented. Unfortunately, when consumption has reached the stage at which it is easily recognized, it has reached the point at which it is incurable.

Prevention.—The prevention of consumption is of more importance than the cure, because, when the disease has once secured a good foothold, it is very doubtful if a cure is possible. Perhaps a majority of those who die of consumption know, before it appears, that they have a predisposition to the disease. They may also know that it is only during the few years between eighteen and twenty-five that they are very liable to be stricken. Knowing these things and that by preventive measures and careful living the dread disease may be avoided, it is wonderful that the prospective victim does not put forth every effort, during those years, to avert it. When he is once in its clutches, he will sacrifice time, money and opportunity, and grasp at every straw that promises help, but all to no avail. By putting forth proper efforts during the years of susceptibility he would be likely to escape and be enabled to consider himself safe the remainder of his life.

The person subject to consumption should, if possible, first of all go to a suitable climate—one that is dry and uniform. The altitude should be moderately high—from 2,000 to 4,000 feet—yet, some low-lying regions are good, and sea voyages are beneficial. The best American climates, in the order of their merit, are as follows: 1. Lower New Mexico and Arizona. 2. Colorado,

Northern New Mexico and Western Kansas. 3. Southwestern Texas and Lower California. 4. Montana and Wyoming. 5. Western Carolinas. 6. Florida and the Gulf States.

The worst climate for a consumptive is that of the North Atlantic States, being cold, moist and subject to great changes.

The residence should be located on high ground and be free from all dampness. Plenty of fresh air is essential, and the rooms occupied should be accessible to sunlight throughout the day. There should be free ventilation by day, and still more by night; and it must be secured without draughts. An outdoor life is to be recommended, if it be possible. At any rate he should be outdoors much of the time, and take plenty of outdoor exercise, but avoid overexertion and exposure. He should bathe daily in tepid, not cold, water; and he should dress warmly, with wool next the skin, summer and winter, day and night. The feet must be protected against both dampness and cold.

Food should be abundant and nutritious. Meats of all kinds should be eaten freely. Fats and rich broths are very useful. Milk and cheese are good, and cream is still better. Alcoholic stimulants are not necessary, and should be avoided, unless the disease actually appears or seems to be appearing.

Breathing exercises are highly beneficial, as they develop the lungs and chest and so give increased vitality. They should be practiced several times daily. Stand erect, with the shoulders well back and the breast prominent; take a full breath, then slowly raise the arms above the head and draw in as much air as possible, then expel it, allowing the hands to drop by the sides. Repeat these movements about ten times a minute, and continue them for several minutes. If these exercises be continued persistently the chest measure and expansion can be permanently increased. They are especially beneficial to young persons, to whom they are recommended. Every cough should be watched and, if it hangs on, or if from any cause consumption is thought to be present, no time should be lost before consulting a physician and adopting more vigorous measures.

Treatment.—When the disease first appears, but has not progressed too far, treatment is beneficial and may be curative. If possible, the patient should go to one of the climates recommended and observe all the rules of health just given, for they apply as well to the primary stages of the disease as to the tendency.

Plentiful feeding is especially necessary. In some hospitals for consumptives, feeding is the only treatment. The patient is fed to satiety, then encouraged to eat still more, as often as five times a day, and good results are obtained. Alcoholic stimulants are now useful. Half an ounce of whisky, with meals, improves digestion and increases the appetite, but two ounces a day will be just as useful as a larger quantity, probably more so. It may be combined with milk and cod liver oil. This oil has long been given and is, no doubt, useful, but more as a food than as a medicine. It should be taken pure if possible, a tablespoonful morning and evening. The various emulsions, wines and cordials of the oil are poor substitutes, and should be taken only when the pure oil disturbs the stomach. Many of them are frauds and contain almost no cod liver oil at all.

Tyson gives cod liver oil in the following manner: "Place in a wineglass a tablespoonful of whisky and overlay it with the same amount of the oil. Toss it into the back part of the throat and it is swallowed with great facility, nothing being tasted but a pleasant residue of whisky."

The whisky not only disguises the taste of the oil, but also favors its assimilation.

Creosote is a later remedy for consumption. It relieves cough and expectoration and, in the early stages of the disease, may be really curative; at least, it comes as near that as anything now known. It is conveniently put up in one grain pills. One, of these may be given after each meal, and the dose gradually increased to five or six three times a day. It is the large dose that does good.

Iron and arsenic are useful in all cases. They may be combined as follows:

Arsenic, Fowler's solution.....two and a half drams.

Glycerole of iron.....four ounces.

Give a teaspoonful half an hour after meals.

Strychnia is valuable as a stimulant and tonic. Give from one-fortieth to one-thirtieth of a grain three or four times a day. Any of these drugs must be given for weeks, or months, to obtain much benefit. Of course, they should not all be given at the same time. In some cases one, in other cases another, is the best remedy.

In the later stages all we can do is to treat the various symptoms, keep up the patient's strength, and delay the dread end as long as possible. All the measures above named are still useful.

Cough.—For the cough, creosote, as given above, is the best remedy. Later it can only be controlled by opiates; at first, codeine, one-half grain, then morphine, one-fourth grain.

Fever.—The fever of consumption needs no special treatment.

Night Sweats.—Night sweats may be controlled by either one-sixtieth of a grain of atropine or twenty grains of camphoric acid (in capsules) at bedtime.

Diarrhea.—The subnitrate of bismuth, in ten grain doses, is the best remedy. Later it may be combined with opium (one grain) or morphine (one-eighth grain).

Constipation.—Castor oil is the safest laxative. Do not give purgatives.

Hemorrhage.—Hemorrhage from the lungs is very alarming, but it usually stops of itself and, from its situation, we can do little for it. Put the patient to bed at once, with the shoulders elevated, and apply ice to the chest over the seat of the bleeding, if this be known. The domestic remedy, feeding common salt to the patient, is also useful, but is not as good a remedy as ice, applied externally. If the hemorrhage persists a physician should be called.

Serum Treatment of Consumption.—In 1890, Koch of Berlin announced the discovery of a substance, tuberculin, derived from the tubercle bacillus, and claimed it to be useful in the treatment of tubercular disease.

For a time it was thought that the long-sought "consumption cure" had been found. Although this tuberculin proved to be of no value, it was a step in the right direction. A somewhat similar substance has since been discovered for the prevention and cure of diphtheria, and is an undoubted success. (See article on Diphtheria.) It is believed by many that every germ disease has within itself the means for its own cure, but this remains to be demonstrated. Vaccination against small-pox is an exemplification of this idea, and the Pasteur treatment of hydrophobia is another.

Many investigators are earnestly working upon the tuberculosis problem, and it may be confidently predicted that the day is coming when a serum, or antitoxin of tuberculosis, will be found

that will prevent and cure the disease, and consumption be stamped out, as small-pox has been wherever vaccination has been practiced. Various serums are now made and used with more or less success, but the subject is yet in the experimental stage.

General Preventive Measures.—As has been said, in practically all cases of consumption of the lungs the germs of the disease enter the lungs from the air. How do they get into the air? In this way: A person affected with consumption spits, anywhere and everywhere, a sputum swarming with germs. It dries and the germs float about in the air as dust. Drying does not kill them, and when they are taken into the lungs they are ready to begin their destructive work. Until the germs have become dry they do not rise in the air. The main point then in preventing the spread of the disease is the disinfection of sputa. For this reason the patient should never spit, except in some vessel or receptacle that can be disinfected and the germs thus be destroyed. If he uses a metallic vessel it should always contain a solution, either of carbolic acid—half a teaspoonful to the ounce of water—or of corrosive sublimate—corrosive sublimate, two drams; tartaric acid, one dram; water, one gallon. The vessel should be washed every day, first with boiling water, then with some of the solution.

Another good plan is to use small pasteboard boxes, or Japanese rice paper napkins, then burn them. On no account should the patient spit on the floor, or about public places, or on the floor of a public conveyance, car or boat. When traveling he may carry a small flask with metallic screw cap. This can be cleaned by boiling, or with the carbolic solution.

When a room is to be occupied by a consumptive patient, it should be stripped of all upholstered furniture, carpets and heavy curtains or hangings. Carpets may be replaced by rugs, that can be frequently shaken and aired.

As the sweat of the patient may contain the germs, no one should sleep with him. It is also better that he should use separate dishes, knives, forks, etc. He should be very careful not to get sputa on his clothes, the bedding, furniture, or floor. A tubercular mother should not nurse her baby. The room or house occupied by a consumptive patient should always be thoroughly disinfected before being taken by another tenant.

To do this follow carefully the directions given in the chapter

on disinfection in this work. All the clothing and bedding should be boiled for half an hour or more. The body of a person having died from any infectious disease should be cremated.

ACUTE CONSUMPTION.

(Quick Consumption.)

Quick consumption is a rapid variety of consumption of the lungs. It is comparatively rare. The lungs rapidly soften and break up, small abscesses are formed and the whole of both lungs is often diseased. This form occurs most frequently in children, and often follows measles or whooping cough.

Symptoms.—In the beginning the disease may resemble either bronchitis or pneumonia. The cough is more continuous, and soon there is fever with sweats. The child loses flesh very rapidly. The cough becomes loose and there is profuse muco-purulent expectoration. Hemorrhage from the lungs may occur early. There are often periods of temporary improvement. During the first week the disease may not be differentiated from pneumonia, but there is no crisis, as in pneumonia, and the patient, instead of getting better, continually grows worse. The disease lasts from three weeks to three months; sometimes longer. The result is death. It may occur within a few weeks, or months, always inside of a year.

Treatment.—The treatment is the same as for the more chronic forms of consumption.

PLEURISY.

Pleurisy is an inflammation of the pleura, or serous sac in which the lung is enclosed. Most cases of the disease are really cases of tuberculosis of the pleura. Many cases are caused by exposure and chilling or "taking cold." It is sometimes caused by Bright's disease. It usually follows a penetrating wound of the chest. There is more or less pleurisy in all cases of pneumonia and pulmonary consumption. The disease occurs in the winter or spring months, is more frequent in males and is comparatively rare in children.

Symptoms.—In order to understand the symptoms it is necessary to know something of what is taking place within the pleura. There is first a congestion and swelling of the membrane, then the formation of a kind of false membrane on its sur-

face, as in diphtheritic sore throat. This false membrane may become permanent in places, forming bands (or adhesions) between two adjacent surfaces. These adhesions obstruct the movements of the lungs ever afterward and, at times, produce a sharp pain, known as a stitch in the side, or a pleuritic stitch. In many cases there is exudation of a thin fluid, or serum, into the pleural sac. This is called a pleural effusion. It may be absorbed again, or may not, in which case it must be removed by surgical means.

In some cases pus germs enter the pleura, and the sac then soon contains a large quantity of pus. This condition is called empyema. It more frequently follows pneumonia.

The first symptom is usually a sharp pain in the side of the chest, but there may be a few days of discomfort preceding this, and there may be a chill. The pain is cutting or lancinating, and it is aggravated by breathing. To avoid pain as much as he can, the patient breathes quickly and with as little movement as possible. There is a hacking cough.

This increases the pain so, it is made very short. There is little or no expectoration. There is always fever, but it is not as high as in pneumonia; usually running from 102° to 103° in the beginning and falling gradually. The patient lies on the affected side, in order to lessen its movements and so lessen the pain. Some cases begin with no noticeable symptoms and the patient, with a large pleural effusion, may go about, apparently well. Some persons may even go through the whole course of pleurisy, from beginning to recovery, and never know it. It is a difficult disease to recognize, except by a careful examination of the lungs.

Prognosis.—Cases caused by a cold always recover. Tubercular cases often recover, too, if properly treated. The disease usually lasts from one to two weeks, but may go on for months. Pleurisy in the course of Bright's disease and pulmonary consumption is always fatal.

Treatment.—Many simple cases recover without treatment. Bleeding was formerly resorted to and did much good, but, owing to a changed sentiment, it could hardly be used now. A blister over the seat of pain is one of the very best measures. After the blister, the silk or cotton-batting jacket should be worn continuously. Morphine (one-fourth grain) is often necessary to relieve the pain. It is essential that the bowels be kept moving freely. A physician must be called sooner or later, as there are

features of the disease that cannot be recognized by the average person, much less treated by him. When there is a pleural effusion, the physician gives remedies designed to aid in its absorption. If it is not absorbed it must be withdrawn by tapping, or by incision, through the chest wall. Either is a simple operation, attended by little or no danger. If the sac is infected and becomes filled with pus, we have the condition known as empyema.

EMPYEMA.

This is a condition in which there is suppuration in the pleural membrane and pus in the pleural sac. It is most frequent in children, and the majority of cases occur with or follow some form of pneumonia, but it may follow pleurisy and, more rarely, measles or scarlet fever. It also follows penetrating wounds of the chest.

Symptoms.—The onset varies so greatly as to render description useless, but after there is pus in the pleural cavity the symptoms are quite uniform. The child is pallid, bloodless, weak and emaciated. The breathing is always rapid (from forty to seventy) and difficult. There is cough and an extremely variable fever, and sometimes there are chills, fever and sweats, as in malarial fevers. When the disease goes on several weeks it may be easily mistaken for consumption. There is clubbing of the fingers, loss of appetite, cough, emaciation and even swelling of the feet. The physician makes sure of the presence of pus in the chest by use of the hypodermic syringe.

Prognosis.—In children, under one year of age, fifty per cent die. In older children and adults, if the disease be seen reasonably early (within one or two months), and properly treated, recovery is the rule. It is the cases that have gone untreated a long time, or refuse an operation, that end in death. There is scarcely another disease that brings a child so low, yet is treated with so much satisfaction and success.

Treatment.—There is no choice or variety of methods in the treatment of empyema, for there is but one thing to do. Call a surgeon who will remove the pus at once by an operation; that is, by an incision through the chest wall. When this is done properly, there is little danger, and recovery is the rule. When it is not done, death is almost certain.

CHAPTER VII.

DISEASES OF THE NOSE AND THROAT.

By W. E. McVEY, M.D.

CAUSES OF COLDS.

To know how to prevent colds we should know something of their causes. They are usually supposed to be due to sudden changes of temperature, drafts of air or exposure; but in perfectly healthy persons these things alone will not cause colds, for they make no impression upon one who has a normal digestion, a normal circulation and a properly attuned nervous system. The digestive organs, the circulatory system and the nervous system are so intimately related that a disturbance of either is sure to affect the others.

The natural consequences of a bad digestion are impaired nutrition, blood but poorly supplied with nourishment for the support of the tissues, and a resulting loss of energy in the nervous system, whereby it can but imperfectly bring about the changes in the circulation which are necessary to the elimination of poisons and to the protection of the body against the irritant effects of heat, cold and dampness. The same results may arise from any impairment of the nervous system or of the circulatory system itself.

In a condition of perfect health the circulation readily reacts upon the depressing influences of atmospheric changes, so that no harm is done, but if either of these great systems is in a bad condition the defense is broken and the influence of the irritant is felt first in that part which can make least resistance. The weakest part of the body is the respiratory tract (organs of breathing), and usually the weakest part of that is the nose; hence, the most frequent result of exposure is a cold in the head. The resistance having once been overcome, each succeeding attack becomes more and more serious, until a condition of continuous cold is established.

THE PREVENTION OF COLDS.

The most important thing, then, in the prevention of a cold, is the maintenance of a perfectly healthy body, and this can be done only by a careful observance of the rules of exercise, diet and hygiene. There are many people, although apparently healthy, in whom there is but little vigor. They lack the power of resistance and consequently are among the most frequent sufferers from colds. In the preventive treatment of such cases two plans have been suggested:

First. Protect the body with heavy clothing and wraps from all possibility of exposure.

Second. Stimulate reaction and accustom the body to sudden changes of temperature by exercise and training, thus increasing its vitality.

A large majority of the class mentioned adopt the first plan, and, in consequence, suffer from every accidental exposure. The man who never wraps his neck seldom has a cold or sore throat, because his neck, like his hands and face, have become accustomed to changes. Those in the habit of "wrapping up" will most certainly take cold if caught without the usual amount of protection, and it is to such people that the second plan of prevention should be rigorously applied. They should begin in summer to prepare for winter, by taking, every morning, a cold bath, or at least a cold shoulder and chest bath, followed by vigorous rubbing with a rough towel. This should be continued persistently summer and winter. If begun in summer the gradual change in the temperature of the water will hardly be felt and reaction from the cold bath will be immediate.

In cold weather one should wear only such wraps as are needed for comfort, and should under no circumstances bundle the neck and ears. Outdoor wraps should be removed on entering warm rooms. The feet should be kept dry. Heavy overshoes, fur caps and fur overcoats should be reserved for long drives or visits to very cold regions. People subject to frequent colds in the head or frequent attacks of sore throat or bronchitis will find this course of great benefit.

A cold may manifest itself within a few hours after exposure, or it may not appear for a day or two. The usual symptoms at first are malaise, aching of limbs and back, fever, some headache, thirst and a dryness of the nose or throat, or both, and a sensation

of fullness in the nose. Later the dryness disappears and there is a profuse watery discharge, to be followed later by a thick, yellowish discharge, which may continue for days or weeks. The fever and aching of the first stage usually subside after the free, watery discharge has well begun.

Treatment.—A cold may be aborted if treatment be begun early enough.

The patient should prepare for bed, soak his feet for about 15 minutes in water as hot as can be borne, drink a hot lemonade, slip into bed and cover up warmly. In moderate cases this is all that is necessary. In more serious cases it is well with the hot drinks to give from five to ten grains of Dover's powder, and, if the attack seems very severe, a five-grain capsule of quinine.

If the cold is thoroughly established, give a pill or capsule composed of two and a half grains each of salol and phenacetin every four hours, and spray or douche the nose every two or three hours with hot water containing a teaspoonful of listerine, or a pinch of common baking soda, to each half-glass of water. Every cold should be thoroughly cured and means adopted to prevent further attacks, for frequent colds develop chronic cold or catarrh.

CATARRH OF THE NOSE.

(Chronic Rhinitis.)

There are three distinct forms of catarrh: Catarrh of childhood (*muco-purulent rhinitis*), dry catarrh (*atrophic rhinitis*) and common catarrh (*hypertrophic rhinitis*.)

The Catarrh of Childhood, sometimes called snuffles, is the form most frequently found in children, especially in those much exposed and poorly fed, or who have inherited scrofulous tendencies. Glandular tissue is more liable to inflammation or disease in children than in adults, and it becomes diseased more readily than the other tissues. In children who have frequent colds the tissues in the nose that secrete mucus become inflamed, and, if the child is badly nourished, either from exposure and bad food, or from inherited tendencies to disease, the inflammation is likely to become chronic. There is, then, an excessive discharge from the nose which changes in character as the disease advances, being at first watery mucus, then somewhat thicker and mixed with pus, which makes it yellowish in color. There is usually considerable swelling of the membrane of the nose, so that the child often

breathes with the mouth open. The accumulated discharge in the nose makes a disagreeable rattling sound as the air passes through it and the child frequently draws the discharge back into the throat and swallows it. If the nose is nearly closed by the swollen membranes the discharge runs out the front of the nose, and, from its irritating effect, the edges of the nose and upper lip often become sore and, frequently, covered with scabs.

This condition may go on for years, sometimes better and sometimes worse, until the secreting tissue has been mostly destroyed and the inflammation has extended to other tissues.

Treatment.—The treatment should be both local and constitutional. By means of an atomizer, or small hand syringe, the nose should be thoroughly washed out with a solution of one part of listerine to seven parts of warm water. This should be repeated two or three times a day, if the conditions warrant it, until all signs of the trouble have disappeared. This is usually all the local treatment that is necessary. If there are sores and scabs around the nose and mouth they should be carefully washed with warm water, then well anointed with carbolized vaseline. The badly nourished or scrofulous child should be given tonics. Syrup of iodide of iron, in from ten to thirty drop doses, well diluted, will be found very efficient.

Catarrh in Adults.—The other two forms of catarrh occur in adult life.

Before describing them something should be said of the structure and functions of the nose. There are three oblong masses projecting from the outer wall of each nostril, known as the turbinate bodies. The lower, which is the larger one, may easily be seen by spreading the nose open a little.

Each of these bodies consists of a shell of bone covered with mucous membrane, in which is a dense network of very small blood-vessels. Between these vessels and the nerves and glands is a substance termed connective tissue; also some fibrous tissue to give firmness to the membrane. The network of blood-vessels serves to warm the air as it enters the nose; also to moisten it. The air we breathe contains some moisture, but is usually ready to take up more, as illustrated by the disappearance of water from a dish on a warm day. The air passages below the nose are supplied with glands to secrete only sufficient mucus to keep the membranes soft and pliable. The mouth is kept moist with saliva, and

the food is moistened by it, but it is not largely secreted except during mastication. The mouth soon becomes very dry at night if one breathes with it open. The amount of mucus secreted in the bronchial tubes and lungs is very small, and the air, unless saturated with moisture before reaching the lungs, would soon take up all the water from this mucus and leave the membrane dry and irritated. The average amount of moisture required to saturate the air breathed by a person every twenty-four hours is estimated at about a pint, all of which is furnished by the blood-vessels in the nose, being exuded through their walls from the blood; but as it is all the time being taken up by the air on its way to the lungs we do not notice it.

As the amount of moisture in the air varies, so the amount required from the nose varies, the supply being governed by the nerves which control the blood-vessels. If more is required the vessels, by dilating, allow more blood to flow, from which more can be drawn. Upon the disturbance of this function of the nose catarrh and its results chiefly depend.

This disease is usually a later development of the condition existing in children as muco-purulent rhinitis, already described. It is in nearly every case confined to adults. The nose is dry and the air passages large. Scabs frequently accumulate in the nose and often a scab is blown out, having the shape of the nasal cavity. If the scabs are retained long they begin to decompose and there is a musty odor. The sense of smell is usually lost. When the scabs have been forcibly removed there is a tendency to bleed. The inflammation which preceded this condition partially or wholly destroyed the secreting cells (the epithelium), the deeper structures of the membrane have become involved, and, mixed with the small amount of mucus now secreted, we have a sticky, tenacious material which coagulates, adheres to and contracts upon the membrane, forming scabs over a part or all of the inside of the nose.

This condition not only prevents the air from absorbing moisture from the blood-vessels, but by contraction drives the blood out of them, thus depriving the tissues of their nourishment, so that they gradually shrink away. From the loss of the moistening function of the nose the throat becomes dry and irritable, and the patient has a chronic sore throat, and, later, may develop a chronic bronchitis.

Dry catarrh is usually considered incurable, but by persistent attention much relief may be afforded, and, if the condition has not existed too long, a cure is possible.

Treatment.—The main object in the treatment is to prevent the adherence and formation of scabs. The nose should be thoroughly cleaned with warm water containing five grains of soda and two drops of carbolic acid to each ounce, or a teaspoonful of listerine to the ounce, after which it should be well oiled with melted vaseline, or with the following ointment:

Vaseline	one ounce.
Boric acid	one-half dram.
Aristol	six grains.
Oil eucalyptus.....	five drops.
Menthol	one grain.

This is best used in a DeVillis atomizer. Some of the ointment should be placed in the bowl, then held over a lamp until thoroughly melted, when it may be sprayed into the nostril. In the melted state it readily spreads over the membrane, and as it cools adheres to it, thus preventing the attachment of scabs and facilitating the removal of secretions. There will be no odor about the nose if it be kept free from secretions, especially crusts and scabs.

After this treatment has been kept up for some time an attempt may be made to restore the function of the nose by the occasional use of stimulating applications, such as

Oil of cubebs.....	five to ten drops.
Alboline	one ounce.

Apply as a spray once a day or every other day. This should not take the place of the other remedies, but be used in connection with them.

COMMON CATARRH.

This form is considered a disease of adult life, although it is frequently found in youth. It is a very common ailment, and much more common in some regions than in others. It often exists for considerable time before demanding attention, when it is noticed that there is a varying but constant discharge from the nose, which is much increased on going out into the cold air, and sometimes greatly aggravated by dust and irritating vapors. There is always some closure of one or both nostrils from the enlarged or swollen

turbinate bodies. In many cases first one side, then the other, becomes closed, and often one nostril is completely closed so that the discharge cannot be blown out, and no air can be inhaled through that side.

When this stoppage is very persistent there is always danger of the ears becoming affected, and deafness of one or both ears may result. Soon or late the throat is sure to become dry and inflamed, because the diseased condition of the nose prevents the air from securing the amount of moisture required, and the watery part of the mucus in the throat is absorbed; or if the nose be stopped the breath is drawn through the throat and the same dry condition of the throat follows.

Among the causes of this form of catarrh are repeated attacks of cold in the head, and exposure to dust, especially in a dry climate with much wind, but probably the most frequent cause is deformities of the nose. In a great many people the septum (partition) between the two sides of the nose is bent so that one cavity is smaller than the other, and in some cases this passage on one side is so small that no air can pass in, while the other side is nearly as large as both should be, and all the air passes in at that side. It is nearly always found, however, that this large passage is partially filled up by a large, red-looking tumor, which is the enlarged turbinate mentioned in the first part of this chapter. This occurs whether one has had frequent colds or not, and does not depend upon dust or climate.

As has been explained, the network of blood-vessels is called upon for more moisture when the air is very dry, and the vessels then dilate and more blood enters. If this demand is permanent the vessels remain enlarged—constantly engorged with blood. The water escapes from the vessels and the membrane becomes swollen. From the increased supply of blood there is overnutrition of the part and new tissue forms, so that the turbinate bodies are not only swollen, but thickened (hypertrophied).

The same conditions are brought about by a deformed septum, and in the same way, for one side of the nose, being often much larger than the other, admits more than its share of the breath, to saturate which it must furnish more than its share of water, and the effect upon the vessels is the same as that of a dry atmosphere. These deformities are almost always the result of injuries, and usually of those received in childhood, as from falls

or blows upon the nose. The injury itself may not have been serious, but results in a slowly developing deformity.

Treatment.—Persistent treatment will, in the majority of cases, cure this form of catarrh. The first essential is cleansing the nose. This may be accomplished in the same way and by the same means as suggested for dry catarrh. After a thorough cleansing, each side of the nose should be sprayed by an atomizer with some of the following:

Alboline	two ounces.
Menthol	twenty grains.
Oil eucalyptus	five drops.
Oil cinnamon	five drops.

Repeat this every day well and persistently for months if necessary.

It is also well to use occasionally an astringent powder. The following may be snuffed into the nose every day or two:

Salicylic acid	ten grains.
Tannic acid.....	one dram.
Subnitrate of bismuth	one dram.

If the obstruction of the nose is very great, or if there is very much thickening of the tissues, these milder measures will do little more than give temporary relief. In these conditions the extra tissue must first be removed or contracted by a surgical operation, which is simple and almost painless, after which the nose should be treated as above prescribed. No catarrh snuff or other remedy should be used which contains cocaine, as by the continued use of these so-called catarrh cures many have acquired the cocaine habit. In mild cases a simple douche of hot water, containing a little soda, will often give great relief, and sometimes afford a complete cure. The most careful observance of the hygienic rules suggested early in this chapter must be insisted upon, if any permanent benefit is to be derived.

ADENOID GROWTHS.

Adenoid (gland-like) growths are masses of soft, spongy tissue which form in what is called the naso-pharynx—that part of the throat which lies behind the nose and soft palate, reaching nearly to the lower level of the latter. They form upon the wall

of this space, hanging down in such a way as to sometimes block up the openings from the nose into the throat, and are of considerable importance because of their interference with natural breathing, compelling the child to breathe through its mouth and producing a peculiar facial expression. There is a dull, heavy look about the eyes, with a prominence of the upper jaw, causing, in many cases, an almost idiotic expression; and there is usually considerable discharge which is frequently removed by disagreeable hawking. If the condition be not relieved permanent damage to the ears may result. They are principally found in children and disappear after adult life is reached.

Treatment.—Removal of the growths is the only satisfactory treatment. This is not a difficult or very painful operation, and is usually done by crushing the soft masses with the fingers, or by an instrument devised for the purpose. After the growths have been removed by the surgeon the nose and throat may be treated after the same plan suggested for chronic catarrh.

If the child is poorly nourished and has a fickle appetite, he should be given the syrup of the iodide of iron in doses of from twenty to thirty drops after meals.

DISEASES OF THE PHARYNX.

The Pharynx, or upper part of the throat, is that cavity the largest part of which may be seen through the arch at the back of the open mouth. The gullet and larynx open into it from below, the mouth and nostrils from above; it also communicates with the drums of the ears by means of two narrow channels called the Eustachian tubes.

The Palate is the roof of the mouth. Its front and back portions are known respectively as the hard and soft palate; the hard palate being the bony portion bounded in front by the sockets of the teeth in the upper jaw; the soft palate consists of the movable muscular portion or back part of the roof.

The Uvula is the little pendant which hangs from the center of the back edge of the soft palate.

The Fauces is the name given to the back part of the mouth or the passage from the mouth cavity to the pharynx, overhung by the soft palate and bounded on its sides by the pillars of the soft palate, sometimes called the pillars of the fauces.

The Tonsils are the two prominent oval bodies situated one

on either side of the throat near the back part of the tongue, and at the summit of the pharynx. The purpose of these glands has never been discovered; a person is quite as well off without them, and in many people they seem to exist only to become diseased.

The tonsils, as we usually find them, are enlarged glands, or masses of glands, situated one on either side of the throat near the back part of the tongue. When much enlarged they are very easily seen, looking like large red tumors, which sometimes seem to come together behind the tongue. Often several large holes may be seen in each tonsil.

Sometimes these holes are filled with a mattery-looking fluid, or may contain masses of cheesy-looking material. If much enlarged, the tonsils interfere with breathing through the nose, especially on lying down, by filling up the space between the back part of the nose and mouth. The same effect upon the countenance and ears may be expected in this condition as in the adenoid growths. In children they often hinder development and cause ill health, both because of their interference with normal breathing and quiet sleep, and by their absorption of poisons. They are most common to childhood, although not infrequent in adult life; but in adults, because of the mouth and throat being larger, they do not so much interfere with breathing. They should be removed by the surgeon. The operation is almost painless, and it is the quickest, safest and in all respects the best treatment.

TONSILITIS. QUINSY. SORE THROAT.

This is an acute inflammation of the tonsils, and usually occurs in persons who have enlarged tonsils, and particularly in those who have a rheumatic tendency. By many physicians, acute tonsilitis is considered one manifestation of rheumatism. It usually comes on with a feeling of malaise, aching of the limbs, chill or chilly sensation, headache, fever, dryness of the throat, and pain, especially about the angle of the jaw.

Swallowing becomes painful and difficult, so that often nothing but liquids can be swallowed, and they are liable to come back through the nose. The swelling of the tonsils may become so great that the patient is threatened with suffocation, although this seldom if ever occurs. Usually at the latter end of the attack, which may last from four or five days to two weeks, if the swelling has been very great, the tonsil begins to look red and tense

at some point, and soon breaks, discharging considerable matter and blood, after which recovery is quite rapid. It is frequently advisable to hasten this process by lancing.

One or both sides may be affected at the same time, or, very often, the attack is prolonged by one side becoming affected about the time the other side is getting well. The fever accompanying an attack of tonsilitis may be quite high, and the patient is usually weak and much exhausted during convalescence. Although a great many things have been considered causes of this disease, it can most frequently be ascribed to enlarged tonsils, or to a rheumatic tendency, or, more frequently, to both these conditions joined to exposure.

Treatment.—When the attack first comes give a cathartic, such as a teaspoonful of sulphate of soda every four hours until the bowels move freely. Then, to control the fever and check the disease, a pill or capsule containing two and a half grains each of phenacetin and salol should be given every four hours. When the throat first begins to feel sore a counter-irritant, such as a mustard plaster, applied to the neck, care being used not to produce a blister, will often be of benefit. The throat should be frequently gargled with hot water containing some antiseptic, such as one part of listerine to seven parts of the water. The throat usually feels hot and dry, and a spray of menthol and oil (see page 386 for formula) will be very grateful to the patient.

Dry heat may be applied to the neck, but poultices should not be used. A moist poultice moistens the skin, but, since the tonsil usually breaks upon the inside, this does not assist the process more than dry hot applications, and the latter are more pleasant to the patient. After the tonsil breaks the throat should be frequently washed out with listerine and hot water, until the discharge ceases.

FOLLICULAR TONSILITIS.

This is a much severer form of inflammation of the tonsils, and is due to a specific poison. All of the symptoms are more marked and more severe. The tonsils appear to be covered with white or grayish spots, from the fact that it usually begins in the crypts, or openings in the glands, and in the follicles which open into these crypts. These spots usually get larger until several may come together, forming a large gray mass or slough, which finally comes away, leaving a large hole behind.

The whole gland may be destroyed in this way. It resembles diphtheria very closely and is so difficult to distinguish from it that physicians usually place cases of this kind under the same restrictions as diphtheria.

See Fig. 2, Plate VI.

Treatment.—In uncomplicated cases the use of the cathartic, the phenacetin and salol, and the listerine gargle, as just prescribed for quinsy, will often prove very efficient. In addition to these the throat should be brushed or swabbed twice a day with glycerole of tannin. Since, in its graver forms, this is a serious disease, its treatment should be under the direction of a skillful physician.

PHARYNGITIS. SORE THROAT.

Pharyngitis may be either acute or chronic, but the chronic form, with frequent acute attacks, is the more common. An acute simple pharyngitis usually arises from taking cold. There is a sense of dryness and stiffness of the throat, with considerable heat and some pain on swallowing or attempting to talk. The throat looks red and glazed, or, later, may be covered with a thick white or grayish secretion, which, after a few days, disappears.

Debility from any cause, sedentary habits, and rheumatic or scrofulous tendencies, by lessening resistance, may be predisposing causes.

Simple gargles of hot water with a little soda, or a spray of menthol and almond oil, are usually sufficient for local treatment. A light physic and three grains of quinine every four hours will usually bring about a recovery. Acute pharyngitis may be modified by conditions previously existing in the throat, the attack being simply an increase of a chronic trouble.

Chronic Pharyngitis is usually a result of nasal catarrh with obstruction and loss of function in the nose, or of exposure of the throat to irritating dust or vapors for long periods, or it may be a result of over or injudicious use of the voice, as with preachers or outdoor speakers. The throat looks rough and usually there are little red elevations seen in the back of it, which are very sensitive when touched. The throat at times, especially in the night, becomes dry and stiff, and in the morning is likely to be found coated with a dry, stiff secretion, which it requires repeated hawking to remove. The voice is generally changed in character,



FIG. 1. Diphtheria (Early Stage).

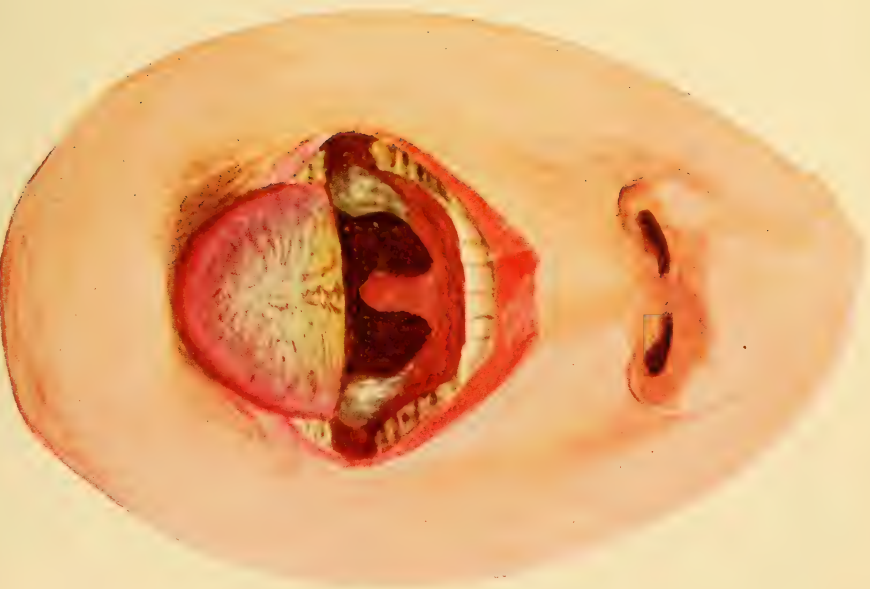


FIG. 2. Follicular Tonsillitis.

PLATE VI.

and speaking is difficult and painful. The pharynx is very subject to irritations and is likely to be much affected by digestive disturbances. Slight exposures in damp or variable atmospheres exaggerate the symptoms and often bring on acute attacks. A cough often accompanies the disorder, and in many cases the vocal organs and bronchial tubes become affected.

Treatment.—Pharyngitis is a serious condition and requires long and systematic treatment for permanent relief. If it is dependent upon nasal catarrh that condition should be removed. The secretion that collects upon the mucous membrane of the throat should be carefully removed in such a way as to cause the least possible irritation. This may be done with dilute listerine, or warm water in which enough soda has been dissolved to give it a slightly alkaline taste. The throat should then be well sprayed with the oil and menthol solution recommended for common catarrh. Two or three times a week the red points should be touched with tincture of iodine after the washing process, and should then be immediately sprayed with the oil mixture.

The worst form of chronic pharyngitis is the dry or atrophic form. This usually follows a catarrh of the nose, when the function of the nose has been almost entirely destroyed. The throat looks dry and glazed, and there are streaks of thick, tough secretion which, when removed, leave the throat very red and inflamed. It is continuously sore and stiff, and often causes much pain in swallowing or speaking. Great care should be used in cleaning the throat, as the removal of the tough mucus irritates the membrane. It is best in such a case to spray thoroughly with the oil solution in the morning before attempting to remove the collected mucus. The oil saturates it and protects the membrane, and should be used as a spray several times each day, and once each day the throat should be sprayed with the following: Oil of cubebs four drams; albolene four ounces. The treatment must be regularly continued for several months if any permanent benefit is to be gained.

THE VOICE.

The Larynx is the voice-box at the top of the windpipe or trachea, containing the vocal cords or lips of the glottis. It is situated in the throat, just below the angle of the throat and

lower jaw, and is composed of two principal cartilages, the thyroid and the cricoid. Roughly speaking, this voice-box is a short tube, three-cornered above and cylindrical below, and, being larger at the top than at the bottom, may be said to resemble a funnel, the upper part of which has been bent into a triangular shape.

The Epiglottis or lid is a soft elastic substance which closes the upper opening of the larynx during the act of swallowing and thus protects the larynx with its delicate organs while the food and drink pass over it into the gullet or esophagus on their way to the stomach; it is sometimes called the cover cartilage.

The Vocal Cords or vocal ligaments are two ledges of elastic tissue, covered with very delicate membrane. Each of them is connected on one side along its whole length with the shield cartilage of the larynx, and their ends also are joined to other parts of the larynx. The term is misleading, as it implies strings like those of the violin or other musical instruments, attached only at the ends and left free at every other point, which is not true of the vocal cords, for they are each attached along one side as well as at both ends and are free only along their inner edges, and resemble membranes or bands rather than cords.

All rules for the care and development of the voice must be in accord with the physiological action of the organs involved in its production. The larynx is primarily the vocal organ and much of the character of the voice depends upon the peculiarities of its construction, but there are other organs and functions concerned that are of great importance. The primary sound is produced by the vibration of the vocal cords, and these are set in vibration by the column of air expelled against them by the lungs, the cords being put upon a stretch and brought closely together. The pitch of the sound will depend upon the length of the vocal cords, the shorter the cords the higher the pitch of the sound produced, and upon the degree of tension, the pitch being proportional to the square root of the tension.

The intensity depends upon the strength of the air blast; the more vigorous the expiration the greater the intensity of the sound. The expired air is, therefore, the power which produces the sound, and is absolutely necessary to the production of voice sounds of any kind.

Upon the perfection and capacity of the breathing apparatus

depend the strength and duration of the voice both in speaking and singing. No matter how complete the construction of the larynx, if there be deficient lung capacity the voice will lack the very essential features of force and duration. It will also lack volume, and it is from this want that so much trouble is frequently produced in the throat by singing or outdoor speaking, for the person tries, by contracting the muscles of the throat and narrowing the tube through which the sound waves pass, to make up by intensity what is lacking in volume. Long or oft-repeated sentences of this kind result in congestion of the pharynx, an enlargement of the secreting follicles and a permanently altered voice.

We have spoken of lung capacity, but there is another element which must be considered, and that is the correct method of breathing. Proper breathing is that by which the whole lung expands at each inspiration. Any mode of dress which prevents the expansion of the lower parts of the lungs, or any habit which restricts the movements of respiration to the upper parts of the chest, is injurious to the proper development of the voice, and to such dress and habits are due much of the throat trouble which afflicts singers and speakers. In this type of breathing the abdominal wall is drawn in while the chest is expanded. The proper method of breathing is neither abdominal nor costal alone, but a combination of the two. At the same time that the ribs of the chest are pushed outward and upward, the diaphragm is pushed downward and the abdominal wall becomes more prominent, so that the whole of the chest cavity is increased in size, allowing the greatest freedom for the expansion of the lungs.

THE CONTROL OF THE BREATH IN SINGING AND PUBLIC SPEAKING.

With ample lung capacity and a correct method of breathing, there is still another consideration to be taken into account. It is necessary, the chest having been filled with air, to be able to perfectly control its escape so that the various degrees of tone power, from the softest possible sound to the most glorious outburst, may be furnished. The escape of air must be controlled in such a manner that there shall be perfect freedom of the muscles about the throat. A great many control the expulsion

of air by contraction of the muscles of the larynx, but it is evident that this prevents a free action of the vocal cords, and, in the effort to sing, or in public speaking, results in considerable strain and often in injury to these delicate organs.

In ordinary breathing the expiration of air is a passive movement, but in singing, when the lungs are filled with air, it is necessary to be able to govern its expiration by the muscles of the chest and diaphragm so that the air is retained or expelled at will. This is not a difficult thing to learn, as will be found by a little practice. A voice which is throaty or tremulous can usually be corrected by applying the principles suggested. As a preliminary to the study of vocal music, every student should be required to take a course in chest development and breathing exercises.

DISEASES OF THE LARYNX.

Diseases of the larynx are dangerous to life because the narrow space between the vocal cords, through which air is admitted to the trachea, and through the trachea and the bronchial tubes to the lungs, may become very much narrowed or entirely closed as a result of such diseases, and because the epiglottis, which is frequently involved in an acute inflammation, may become so swollen as to entirely cover the opening and prevent the entrance of air. They are frequently very serious, also, because of the permanent alterations which they may produce in the voice. For these reasons, although there are many diseases of the larynx, for all but the simpler ones a physician or specialist should be consulted as early as possible.

In many cases of irritable pharyngitis, where there is much cough, the larynx may become sore and inflamed from constant coughing. It usually passes off on removal of the cause. A simple laryngitis is usually a result of a cold. Many people on taking cold feel the first effect in a soreness of the larynx, with hoarseness and cough. The trouble may remain in the larynx, but usually it progresses into the trachea, and sometimes into the bronchial tubes, before relief is obtained. The ordinary treatment for a cold, as already outlined herein, is the proper plan to pursue, with the addition of steam inhalation. A paper cone placed over a cup of steaming hot water, into which a little camphor or oil of pine has been dissolved, makes a very con-

venient inhaler for this purpose, the apex of the cone being taken in the mouth. While inhaling the steam the breathing should be natural, or but slightly increased in depth. The inhalation may be repeated every hour or two and affords much comfort as well as hastens the cure. A spray of peppermint and oil may be thrown downward in the throat during inspiration, or with an ordinary atomizer the larynx may be thoroughly medicated by closing the lips over the tube and breathing deeply while the spray is made.

Counter-irritants applied to the outside of the neck may prove of much service at the beginning of the attack. Mustard plasters, or an application of kerosene, will answer the purpose. It is not desirable to keep the neck bundled in flannel cloths, as is often the custom. The bowels should be kept freely open, and if there is much cough it should be controlled with small doses of Dover's powder, or some opiate mixture, for these, while relieving the cough, also prevent spasms of the glottis, which are painful and occasionally threaten life.

A very good cough mixture for such cases is made as follows:

Paregoric	two parts.
Rum	one part.
Treacle	one part.

Dose.—A teaspoonful every three or four hours, as may be indicated.

A very grave complication may arise in apparently very mild cases. The tissues about the larynx, especially the membranes covering the epiglottis, are liable to become infiltrated with serum, and they may rapidly become so puffed that suffocation is threatened. In such cases, if medical assistance be not at hand, the patient should be put into a sweat bath as quickly as possible and freely given hot drinks and hot steam inhalations. If the condition is not readily relieved, it may be necessary for the physician to puncture the swollen tissue and allow the fluid to escape, or if there seems great danger of immediate suffocation it may be even necessary to open the trachea through the neck, that air may be admitted to the lungs.

If an attack of laryngitis be long continued and accompanied with much cough and hoarseness, the voice may be permanently changed, occasionally completely lost. If the trouble

does not readily yield to the simple plans of treatment, a physician should be consulted, for the condition may be due to tuberculosis, or some other infection, or a tumor may be developing in the larynx. There are many chronic diseases of the larynx, and as their proper management requires skill and experience, we can only recommend the most simple measures for the patient's own administration. Consumption often begins with a tubercular laryngitis which, with prompt and proper treatment, may be cured and the patient's life prolonged, but very early recognition and attention are required. If there be a history of tubercular infection, much relief will be afforded the trouble in the larynx by inhalations of pure beechwood creosote, taken by means of the simple paper inhaler already described, using five or ten drops of the creosote in place of camphor or in connection with it. A physician should be consulted as early as possible, however, for the progress of the disease may indicate additional treatment.

The importance of giving early attention to any disease of the larynx cannot be too strongly urged, on account of the delicacy of its make-up, and its relation to the most important function of life, respiration. Because of the alteration of voice in protracted cases of pharyngitis, people are often led to believe that the vocal cords are affected, but it will usually be found that there is nothing the matter with the larynx excepting a slight irritation, the change in the voice and difficulty in speaking being due to the thickening of the membrane covering the rear wall of the pharynx, which acts as a sounding-board for the vocal organs.

The involvement of the larynx in catarrhal diseases of the nose and throat is usually due to irritation from mouth breathing, from coughing, or from reflex irritation, and depends for its cure upon the relief of the other troubles. Paralysis of some part of the larynx sometimes follows diphtheria, but is generally only a temporary difficulty.

The following warning, given by Pattou in his excellent work on "Voice Production," cannot be too carefully heeded: "Breathing cold air through the mouth, besides drying the mucous membrane of the pharynx and larynx, exposes these parts to unnatural and sudden reduction of temperature, in consequence of which temporary hoarseness is often produced. But particularly

when the vocal organs have been overexercised and overheated, by singing or speaking in warm rooms or halls, should the singer or speaker refrain from exposing himself, without due precaution, to the very cold or damp outdoor air; and surely he should not breathe with open mouth unless he desires to be visited with serious disorders of the respiratory organs, such as congestion of the larynx or lungs."

CHAPTER VIII.

THE EYE AND EAR.

By J. E. MINNEY, A.M., M.D.

The eye and ear are organs of special sensation. They do not see or hear, but impressions made upon them are conveyed by nerves to the brain, which takes notice of them, and the perceptions by the brain of these impressions are called seeing and hearing. These organs also give expression and beauty to the face. Nothing so improves the personal appearance as pretty eyes and ears. There are too many diseased eyes and ears; too many, because a very large proportion of their diseases are preventable. The way to do these organs most good is to intelligently care for them before they become permanently disabled.

THE EYE.

More is now required of the eye than at any other time in the world's history, and as success or failure is largely dependent upon good sight and hearing during the preparation for the life-work, and as the disorders grow more serious, often becoming incurable with the lapse of years, early childhood is the proper time to carefully search for their weaknesses and defects. In most cases they may be remedied or permanently cured.

Children do not often try to deceive. When, to see pictures, print or other small objects, they hold them very near the eyes, the eyes are at fault. When a child complains that he cannot see figures or writing on the blackboard at school, as the other children can, his eyes should be examined by a competent oculist, not by a man who has spectacles to sell and "examines all eyes free," for a matter of so much importance should be intrusted only to the most thoroughly competent, whose disinterested advice can be relied upon and will therefore be worth many times the small sum it will cost. If glasses will correct the trouble he will order them; if the defect be something else, he will point it out and apply the proper remedy, unless it be beyond the reach of remedies, in which case both parent and child, by know-

ing the truth in the beginning, can plan the work for life accordingly and avoid disappointments and heart burnings in later years.

Twitching Eyelids.—An examination should also be made if there be twitching of the eyelids, or if the eyes become red and watery, especially if the trouble be made worse by school work, reading or sewing, or if much use of the eyes brings on headache. This headache is more likely to be a browache; there may, however, be pain in the temples and back of the head or in the neck. In some persons an unpleasant blurring of lines occurs in looking over striped or checkered goods. At other times there are burning sensations, often deep-seated, in the eyes, and the eyeballs feel sore when pressed. In such cases advice should be sought.

Bright flashes of light appearing when the eyes are closed, and increasing on lying down, are very grave symptoms, meaning functional or organic disease of the inner coat of the eye (retina). No time should be lost before seeking advice. The sensation of black floating specks in the eyes may be caused by a bad stomach, but it is a dangerous sign. When the eyeball is painful and feels full and hard on pressure it is a serious symptom. The condition is called glaucoma, hard eyeball. Treatment should be sought immediately.

Lumps formed in the eyelids are enlarged glands (chalazii). Although not generally painful they should be removed. They are caused by eye strain and disease of the lids. Small boils upon the eyelids are called sties (hordeolii) and are painful and red. Owing to the loose structure of the eyelids they sometimes cause the whole lid to swell and look puffy. They should be opened the same as boils on any other part of the body. Sometimes they can be driven away by applying hot water to the eyelids. The water should first be boiled for fifteen minutes, then, as hot as can be borne, be applied for ten or fifteen minutes from the nozzle of a fountain syringe, or from cloths wrung from the water every half minute. To secure complete asepsis (freedom from all germs) it is necessary to also boil the syringe, cloths or any other utensils used in connection with the eyes. When the eyes have thus been bathed they should be let alone until time for the next douching, unless dry and painful, in which case anoint them with a little vaseline.

Conjunctivitis.—When the eyes are red and the lids stick

together in the morning, the disorder is called conjunctivitis, meaning an inflammation of the inside lining of the eyelids. It is caused by dust, smoke, particularly tobacco smoke, exposure to cold or heat, bright light, bad ventilation, etc. It is common in such occupations as milling, scissor grinding and threshing, and is frequently caused by partaking too freely of "bottled goods." Certain diseases, as measles and scarlet fever, also cause conjunctivitis. When this inflammation lasts several weeks it becomes chronic and sometimes gives rise to a condition known as granulation of the eyelids. The inner lining of the eyelids, called the conjunctiva, when everted (turned out) looks rough, an appearance caused by minute, raised, red, warty points.

Sometimes the conjunctiva presents a frog spawn appearance. Granulation in any form is hard to cure. Its natural tendency is to get worse, and many cases of blindness have resulted from granulated eyelids. The treatment should begin early and be followed persistently until a cure is effected.

When the lashes turn in against the eyeball and scratch the delicate skin they cause sores and sometimes blindness. An operation is required which will cause the lashes to turn outward. Pulling them out is a temporary expedient and must be done for immediate relief, but as the disorder grows worse all the time, an operation is the treatment demanded.

Ulcers.—Little white specks upon the cornea (crown), commonly called the colored part of the eye, are dangerous. They are little ulcers, or blisters that will break and result in ulcers. Ulcers are eating sores. They may either come upon or spread over the sight of the eye, and, if deep, leave scars when they heal. When over the sight of the eye, a white scar causes more or less blindness; hence wounds and ulcers of the eyeballs are always dangerous.

Contagion.—It is prudent to consider every eye affection contagious, but especially so when the eyelids stick together, or the lashes are matted together, or there is a mattery secretion from the eyes. Granulated lids are highly contagious. As a measure of safety any person having a sore eye should have a wash basin and towel for his own exclusive use, and if the eyes be mattery should sleep alone.

A Pterygium (wing) is a growth upon the outside of the

eyeball, extending from the inner corner of the eye, and its point sometimes reaches over the colored part and covers the sight of the eye. It is of a red or whitish color and is more or less fan-shaped, with the handle of the fan pointing toward the colored part of the eye. It is not a cataract, though often so called. Its treatment consists of its removal, which can safely be done.

A Cataract is an opacity (whiteness) of the crystalline lens, and as the lens is situated within the eye directly behind the pupil, it gives the naturally black spot in the middle of the eye a gray or white appearance. Removal is the only treatment. This can be safely done only by a skillful physician, and it must be ripe before removal. This condition has arrived when the patient is barely able to count his fingers when held two feet or less from his eyes. The operation consists of the removal of the natural lens and the substitution of a glass lens, after the eye has healed, the latter being worn over the eye in spectacle form.

HOW TO FIND THE CAUSE OF AN EYE TROUBLE.

In searching for the cause of an eye trouble the following points should be noted:

1. The length of time the eyes have worked. They should be rested at least every hour.
2. The character of the work, whether fine or coarse, clearly or dimly outlined. The finer the work or the poorer the print the longer the eyes should rest, and the shorter should be the intervals between the rests.
3. The distance of the work from the eyes. From twelve to fourteen inches is the proper distance.
4. The character of the light. The best artificial light is furnished by the argand burner known as "the student's lamp."
5. The relation of the light to the eyes. It should come from the left side or above, and is best when falling over the left shoulder, especially for right-handed people.
6. The position of the body. It is very important that the upright position be maintained.

If all the above conditions are found favorable, the uneasiness of the eyes on doing their work is probably due to an error of refraction or accommodation, for the correction of which proper

glasses are the remedy. Still, the trouble may be caused by a slight congestion of the mucous membrane of the eyes, or by some exposure, as to wind, dust or tobacco smoke.

If error of refraction or accommodation be the cause, pain in the eyes is likely to follow; also tenderness of the balls when pressed in the morning; or there may be some redness of the eyes, or branny scales on the margin of the lids, sometimes accompanied by a slight thickening of the lid margins. Slight shooting pains in the brow or temple, increasing to headache, and pain in the back of the neck, often come on after a time. Nervousness and irritability of temper may also attend or follow these errors.

It may be better, before having the eyes fitted with glasses, especially if the troubles mentioned have begun, to rest the eyes a few weeks and give them treatment. If the difficulty be acute conjunctivitis or slight granulation, drop into each affected eye three or four dropperfuls (a small syringe such as is used to fill a fountain pen is a "dropper") of saturated solution of boric acid crystals at bedtime and follow with a little vaseline or, if the acid solution be harsh or painful, with cocainized vaseline (cocaine one-half grain, vaseline one ounce).

The hot water treatment recommended for sties is also excellent for conjunctivitis when there are free secretions. For the congested stage, with dry, hot, shiny mucous membranes, ice compresses are probably better.

When there are branlike scales on the margins of the lids and roots of the eyelashes, and crusts form and the lashes fall out, either nitrate of silver or the yellow oxide of mercury is needed to make a quick cure. The nitrate of silver is used as a solution, from five to twenty grains of it to an ounce of distilled water. The mercury is used as an ointment, one grain of it to one dram of vaseline. Before using either the scales and crusts must be completely removed by soaking and washing with warm alkaline water, then gently scraping them away, after which dry the parts and apply the remedy. In using the ointment rub it in thoroughly and wipe off the excess. The treatment should be made every day or every second day, according to the tolerance of the parts, and, preferably, in the evening, for appearance sake and as little exposure as possible to outdoor air. From six to twelve treatments usually cure the case. If

a strong solution be used, great care must be taken not to get the silver into the eyes.

Epiphora, lachrymation, tearing or watering of the eyes, of which people frequently complain, is due to some irritation or overstimulation of the lachrymal glands. The tears run over the eyelids onto the cheek, sometimes scalding the skin and destroying the epithelium. The eyes have a red appearance and often the edges of the lids are swollen. The mucous membrane of the eye usually furnishes sufficient moisture, and the lachrymal gland is called upon only when an excess of fluid is required, as when dirt gets into the eye, or the conjunctiva becomes dry and rough, or the terminal nerve filaments of the conjunctiva, iris, retina or ciliary body become irritated. The irritation may be caused by eyestrain, by a foreign substance, either solid, fluid or gaseous, by disease, or, in old persons, by relaxation of the eyelids, permitting the puncta to be everted. The puncta are the openings on the eyelids situated on their inner margin near the angles of the eyes and hugging the eyeballs. They receive the excess of fluid and convey it through tubes called canaliculi to the nasal ducts which open into the nose.

The tears overflow the lids when there is an excess of them, or when the lids are everted, for then the fluid cannot get into the openings to be conveyed away. An examination should be made to determine whether the parts are in position, as well as to look for foreign substances and diseased conditions. If nothing wrong has been found the eyes should next be tested for distance and reading.

If the trouble be due to eyestrain the proper glasses will correct it; if to a foreign body, its removal will effect a cure; if to tobacco smoke, bad ventilation, physical weakness or overworking of the eye, the remedy is the removal of the cause. If the vision is perfect and the examination has revealed no cause, eyestrain or a closing of the puncta or canaliculi with a gelatinous mass may be suspected and these ducts probed. As only an experienced oculist should undertake this, the details need not be given here. Closure of the nasal duct is one of the serious affections of the eye.

Photophobia or intolerance of light is mainly due to the same causes as lachrymation and is cured by the same treatment.

Crabs.—Occasionally pediculi pubes or crab lice are found

at the roots of the lashes, causing irritation and itching. In such cases a glass will reveal their presence and mercurial ointment will destroy them.

Ulcers.—For severe ulceration of the cornea separate the lids and drop into the eye two or three dropperfuls of warm water containing all the boric acid crystals it will dissolve, then dry the eye of all water and secretions and drop into it two or three drops of a solution composed of two grains of sulphate of atropia to one ounce of distilled water. Repeat the treatment every four to six hours when awake, according to pain. The acid solution should be used warm, made so by keeping the bottle in a basin of clean hot water fifteen or twenty minutes. The dropper should be cleaned by being scalded inside and out each time before using it.

Infantile Sore Eyes.—This affection attacks infants from the first to the tenth day after birth. The edges of the eyelids look a little red and swollen and may stick together, and the white of the eye appears somewhat red. A pearly tear may be in the eye although the child has not been crying, and there may be an itching sensation causing the little one to rub its fists in the eyes. Should the lids stick together tightly and some pus appear, in addition to some or all of the above symptoms, there is great danger of an attack that may terminate most seriously, for cases of this kind, if let alone or improperly treated, generally result in partial or total blindness of one or both eyes.

Great care should be taken to clean the eyes and get out all the maternal secretions as soon as the child is born. If a pregnant woman has leucorrhea, commonly called whites, especially if the secretion makes her sore, scalds the parts, all possible care must be taken to keep the genitals clean. They should be syringed daily with at least two to four quarts of water with enough common baking soda, not baking powder, added to make the water taste of it distinctly. A tablespoonful of carbolic acid to a half gallon of water will do as well. If the scalding maternal secretions get into the child's eyes in its passage through the canal, unless promptly and entirely removed they will set up the most virulent inflammation known and quickly destroy the eyes. The statement often made that exposure to strong light causes this trouble is not true. An infant should

not be exposed to strong light too soon lest it injure the eyes, but this injury is to the sight itself; it does not produce a "mat-tery eye."

A physician should be called at once. If the disease has progressed so far that the eyelids are swollen and pus is pushing out between them, it will be a very hard case to manage, but with constant attention and careful cleansing, under the direction of a skillful physician, the eyes may yet be saved. If but one eye is affected the other should be bandaged immediately, and kept bandaged, to prevent the secretions from getting into it; and the child should be kept lying upon the same side as the affected eye, or upon its back, that the secretions shall not flow over the bridge of the nose and contaminate the healthy eye, and, for the same reason, it should always lie upon the affected side while the eye is being washed or dressed. The eyes should be cleaned often, frequently as often as every half hour, after which a little vaseline or cold cream should be rubbed upon the edges of the lids to keep them from sticking together and to soothe the inflamed surfaces. Great care should be taken by the nurse to prevent the poisonous secretions from getting into her own eyes and the eyes of others in the family. The cloths and cotton used must be burned, and the hands carefully washed with good soap after each treatment. If the secretions scald the eyelids, cheeks or nose, these parts must be kept anointed with vaseline, cold cream, fresh lard, or some other bland salve, which must be washed off once a day with warm soft water containing a little soda.

SLIGHT AILMENTS OF THE EYE.

Slight ailments of the eye, like slight affections of other parts of the body, have a tendency to recover without treatment. A certain percentage, however, of all cases, from lack of vitality in the organism, will not recover spontaneously, and as we do not know the end from the beginning, every affection of the eye should receive prompt attention, but it is better to let it strictly alone and do nothing for it than to do anything that will injure the eye.

Treatment.—There is no more useful agent in the treatment of its diseases than hot water, plentifully used. Aside from the heat, which is a quickening force to nature's lagging powers, it

dilutes and removes the poisons and filth that cause or prolong the diseased condition. Cleanliness, protection and rest are the conditions essential to recovery. To secure cleanliness use plenty of water that has been boiled and use it as hot as can be borne. To the water may be added enough salt to make the water taste of it, but much better than salt is a teaspoonful of boric acid crystals added to each pint of water. Although there be no secretions in the eye, the latter wash is an excellent one, being a cleansing and soothing disinfectant and entirely safe.

Two teaspoonfuls of witch hazel, or listerine, or one teaspoonful of carbolic acid, added to one pint of boiled water, also makes a good remedy; and a teaspoonful of pulverized alum to a pint of boiled water is useful when the eyes are itching. Cold applications should be used only when the hot ones do not give relief.

To bathe the eyes with hot water, first boil it ten or fifteen minutes and let it cool to the temperature of endurance in the vessel in which it boiled, to make sure of cleanliness or asepsis, then, keeping the vessel on the hot stove, bathe the eyelids for five minutes, using a clean cloth that has also just been boiled. Let it be remembered that cleanliness is of the greatest importance and that thoroughly clean water can be secured only by boiling it. It is better that the basin or pan used should be a new one, kept expressly for this purpose, and thoroughly cleansed by frequent scaldings. The whole body should be bathed once or twice a week and the rubbing and drying done by the nurse or attendant.

Dust, some kinds of gas, and smoke, especially tobacco smoke, are very injurious to a sensitive eye. Keep out of the room while it is being swept and dusted. Washing and ironing, in fact all heavy work, should be abandoned for the time, as well as all eyework, such as reading and sewing, and the eye be given perfect rest.

Eye shades may be worn with benefit to protect from the direct rays of light. Where the trouble is due to dirt, bright light, smoke, heat, cold or wind, plain ground glasses should be worn during the exposure, but, if the light irritates, wear plain ground smoked glasses, shaded according to the intensity of the light and the sensibility of the eye. Goggles are not good for the eyes, as they retain the heat and moisture of the parts,

and the ordinary glasses found in drugstores are imperfect and not fit to be worn over the eyes.

DIET.

The diet at such times must also receive attention and should consist of bulky, easily digested, nutritious food, and such meats as pork, veal and beef should be prohibited, particularly in cataract when attended with frequent urinations, and in elderly people suffering from any severe injury to the eyes. Fruit, vegetables and cereal foods should be the principal diet, but where milk agrees it may be taken in reasonable quantity.

REMOVAL OF FOREIGN BODIES.

Pieces of steel, cinders and other foreign bodies can be removed, when seen in the eye, by gently rubbing over them a few times a piece of clean soft silk or cotton cloth stretched over the end of the finger, or a small piece of clean wood, as a lead pencil. If the mote be fastened to the eye and resists removal, it is better, after several attempts, to seek the aid of a physician than to risk doing great violence to the eye, for, as already explained, wounds upon the eyeball are dangerous.

In case the object cannot be seen upon the eye, the lid should be turned inside out, when the mote will usually be found to be a little black speck sticking to the mucous membrane (inside skin) of the eyelid and can be removed in the manner first described, or with a little skill on the part of the examiner it may be scraped off with a dull knife-blade or the end of a toothpick. For a time after the removal there may be pain, as though the object were still there, because of the delicate skin having been cut.

To turn the eyelid of the left eye inside out catch the lashes between the thumb and index finger of the left hand, pull the lid down and while it is stretched place upon it above the thumb and finger a knitting needle, lead pencil or some such instrument, and while pushing it downward and backward with the right hand pull the lid downward, outward and upward with the left, thus exposing the inside so that the entire surface can be examined. To turn the lid of the right eye catch the lashes with the fingers of the right hand and use the needle or pencil with the left hand. The patient should look down constantly

while the lid is being turned and the first examination made, but may assist a further examination by rolling the eyeball in various directions.

TEN DON'TS.

1. The eyes should not be poulticed. A poultice contains heat and moisture, which aid suppuration or rotting. An eye as well as a boil can be rotted by a poultice. Slippery elm, scraped potato, rotten apple, several folds of wet cloth, flaxseed meal, cornmeal, bran, all are used as poultices, and cloths wrung from out hot water and left upon the part until they become cool act as poultices. Don't use them.

2. The eyes should not be exposed to outdoor cold for half an hour after bathing them with hot water.

3. Do not look at an intensely bright light, such as the sun, an electric light, calcium light, a bright lamp flame, bright fire or snow under bright sunshine. Snow blindness is not uncommon.

4. Avoid tobacco smoke. To the sensitive eye it is very irritating.

5. Never use the eyes long at a time when recovering from a debilitating illness.

6. Never read while lying down. The body should be erect when you do any close eye work.

7. Never face a light while reading or using the eyes steadily at any close work.

8. Never use the eyes more than an hour at close work without resting them. Unless they are good and strong they should be rested oftener than that. Don't fail to do it.

9. Don't use a public wash dish and towel. They may often be convenient, but, by increasing his work, are of far more value to the oculist than to you.

10. Do not use home treatment for an eye unless you know that the trouble is not serious, but seek the best medical advice you can obtain.

THE LIGHT OF SCHOOLROOMS.

In planning schoolrooms not enough attention is given to the requirements of vision. Correct architecture favors the health of the eye as well as that of the body. There should be the largest possible amount of light consistent with safety of

construction, and it should all be admitted from one side of the room. The common method of placing windows in opposite sides of the room is very bad, since by causing cross lights and perverse shadows it greatly and needlessly increases the strain upon the eyes of the pupils. The arrangement of every room should be such as to admit the light from the left side and rear.

As the position of the body in school work is an important factor of health and perfect sight, not only during childhood but throughout the pupil's life, the seat and desk should be so adapted to his form as to make the erect position the easiest and most natural; and to favor the eyes the blackboards should be on the right and front sides of the room and be covered with wall maps or light colored curtains when not in use. The walls should never be of dazzling white, but of some neutral tint of blue, yellow, gray or green, and the hangings, decorations and furniture should be of some light color. Of course, shades will be used to prevent direct rays of the sun from falling upon the pupils. All exposures should be to the east, south and west and the city school should be at a distance from surrounding buildings of at least twice their height.

Were these suggestions observed in the construction of all school buildings the startling percentages of eye failure and disease contracted during school life would cease to be a disgrace to our educational system.

TESTING THE EYES FOR GLASSES.

The correction of defective eyesight by means of glasses depends upon the principles of refraction of light by means of lenses. When one engaged in reading, sewing or other close use of the eyes prefers to hold the work more than from twelve to fourteen inches from the eyes he is affected with far sight (*hypermetropia*), or old sight (*presbyopia*), and should wear convex glasses to correct it. When he holds his work nearer than from ten to eight inches he has near sight (*myopia*), and should wear concave glasses.

TO TEST FOR OLD SIGHT.

The figures above the smallest type on the next page that can be read distinctly and easily in a good light at a distance of

fourteen inches indicate the focus and size of the convex glasses needed. If you can easily read the smallest type here given your eyes do not need glasses.

TYPE FOR TESTING THE SIGHT.

0.50=80

Defects of eyesight requiring correction by the use of spectacles are purely mechanical, and can be so corrected by the proper adjustment of perfectly made lenses that their effects will be entirely obviated.

0.63=60

The smallest size letters on this card should be read easily at fifteen inches from the eye. If you cannot do so you should wear spectacles. It does not pay to buy cheap spectacles.

0.75=52

They distort the rays of light, disturb the angles of vision, cause pain and discomfort and injure the eyesight. When it is necessary to hold work or reading matter farther than fifteen inches from the eyes in order to see distinctly,

0.88=44

it is a sure sign of failing vision, and much annoyance, discomfort and pain will be prevented by having a pair of glasses fitted. Pain

1.00=40

in the eyes when wearing spectacles is usually caused either by improperly

1.12=36

fitted lenses, or from the centers of the lenses not corresponding with the

1.25=32

centers of the eyes. To be perfect, a lens must be made with

1.50=26

highly polished surfaces of accurate curvatures. Only perfect lenses should ever be used. They

1.75=22

are made from the clearest and finest material obtainable

2.00=20

**AND SHOULD BE WARRANTED
TO BE OF ABSOLUTELY**

2.25=18

PERFECT CONSTRUCTION

2.50=16

BUY NO OTHER KIND.

3.00=13

THE VERY BEST

3.50=11

LENSES

4.00=10

ARE THE

5.00=8

CHEAPEST

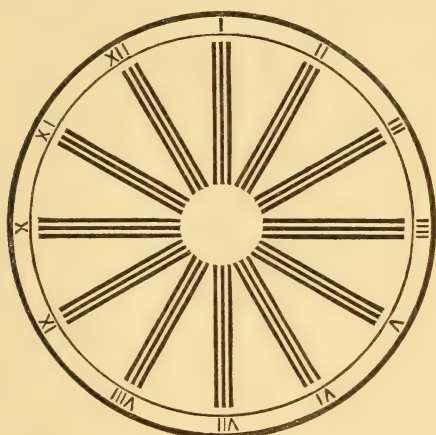
TO TEST FOR NEAR SIGHT.

Find the farthest distance from the eyes at which paragraph No. 26 can be plainly seen. The number of inches between the page and the eyes will be about the same as the number designating the concave lenses required.

TO TEST FOR ASTIGMATISM.

Astigmatism is an eye defect whereby the rays of light derived from one point are not brought to a single focal point,

thus causing imperfect images or indistinctness of vision. If some of the arms in the accompanying figure appear more distinct than the others, the presence of astigmatism is indicated.



This defect can be corrected only by the use of cylindrical lenses carefully ground to the oculist's order.

THE EAR.

The ear is the organ of hearing and in man is composed of three portions: The external, the middle and the internal ear.

The external ear consists of the pinna, or exposed part, and the auditory canal leading to the drumhead, the two forming a funnel that collects the sound vibrations, determines their direction and conducts them to the middle ear, or drum, which is a bony cavity, lined by mucous membrane, separated from the external ear by a delicate membrane called the *membrana tympani*, or drumhead, and containing the chain of small bones composed of the malleus, incus and stapes (hammer, anvil and stirrup), which transmit the vibrations of the drumhead to the inner ear. This cavity also receives the Eustachian tube in front connecting with the throat, and has an opening behind that communicates with the mastoid process—the bone that can be felt by pressing upward just behind the lobe of the external ear. The inner ear or labyrinth consists of a bony cavity called the vestibule, the three semicircular canals that connect with it, and a bony structure in the form of a small shell called the cochlea, all occupied by the auditory nerve.

The hearing may be impaired by a plug of wax, or by a bean, cherrystone or other foreign body in the external ear; or by a thickening of the drumhead by catarrh of the middle ear; or from a stiffening of the joints between the ear bones, the same as a knee or elbow joint may become stiff.

CAN DEAFNESS BE CURED?

The question is often asked, Can deafness be cured? When of long standing it is generally incurable, but in a large number of cases deafness can be prevented, and the time to prevent it is when the ear first becomes affected. Neglect to treat the ear early is the principal cause of most deafness. The old idea, "Let a running ear alone," will, when put in practice, not only make deafness sure, but may cause death, for if the discharge is allowed to continue, not only the soft parts but finally the bones of the ear become involved. In some of the diseases of childhood, especially measles and scarlet fever, ear trouble is common, and many persons can date the beginning of their deafness from attacks by these maladies. Catarrh of the middle ear results from cold, and though not as common as that of the nose, is of frequent occurrence.

EARACHE.

Earache, or pain in the ear, is a common affection, so common that proper attention is not given it, and impaired hearing or deafness is often the result. It may be caused by exposing the ear to a cold wind, especially while sitting or riding, or by bad teeth. Such affections are classed as neuralgias. Boils in the ear canal are frequent causes, but the most common cause of all is an ear abscess called suppurative otitis media. With this abscess the pain is deep-seated, the hearing is dull, the ear feels full and hot, chilly sensations are often felt, the temperature ranges from 99 to 104 degrees, there is headache, and pressure directed inward upon the front part of the ear, or pulling the ear increases the pain, often causing the patient to cry out in agony, and the drumhead, if it can be seen, looks red and bulged out.

A child thus afflicted, by throwing its head from side to side and scratching the affected ear, often causes his parents to think he has brain fever, and there is danger of brain trouble in diseases of the middle ear.

Treatment.—The correct treatment for abscess consists of cutting a small slit through the drumhead, thus allowing the pus to escape. The wound made by the knife soon heals, leaving the membrane as good as ever, but when an abscess is permitted to break or rot its way through it is likely to destroy the membrane, and perhaps one or more of the bones, which in either case means permanent loss of the ear. As the entire malleus is scarcely a third of an inch in length, and its handle, lying against the drumhead to receive the vibrations, is only about the size of a pin, the destruction of which means instant and incurable deafness, it can be understood that lancing an abscess is a very delicate operation and should be attempted only by one who is skillful. An artificial drumhead may be useful where there is a large opening, or entire absence of the natural drumhead, but, as a rule, when the natural drumhead is present an artificial one is of no benefit and may be injurious.

BOILS IN THE EAR.

Pain, swelling, redness and tenderness on pressure are also present when there are boils (furuncles) in the ear, and sometimes there are chilly sensations, but the pain is not as deep-seated and the constitutional disturbances (fever and rapid pulse) are not as great as when there is an abscess in the middle ear. These boils are generally brought on by picking or scratching the canal of the ear, as with a pin, match, toothpick or fingernail. When the discharge from the ear becomes offensive and continues for several months it is likely that the bones of the ear are diseased. The penetrating, offensive odor is from dead bone and indicates a condition dangerous to life.

Treatment.—Neuralgia (nerve pain) of the ear is relieved by steaming. Make a large cone from a newspaper; place its large end over a pot or teakettle of boiling water, and, holding the ear over its small end and as near as the heat will permit, steam the canal and drumhead of the ear until the pain is relieved. This usually requires from three to ten minutes. Repeat several times in as many hours if the pain returns. Dry the ear each time and put a little cotton in it to keep out the cold air. If the neuralgia is probably caused by bad teeth, have an examination made by a competent dentist, who, if he finds it, will remove the cause.

If the earache comes every other day it is of malarial origin and quinine will cure it. From fifteen to twenty grains of it should be taken in five-grain doses in one day, preferably the day of least pain.

If the earache be due to a severe cold; the cold must be treated. A hot footbath lasting ten minutes, and, where the head or nose is stopped up and the secretions are free, ten drops of the fluid extract of belladonna in twenty teaspoonfuls of water, one teaspoonful taken every half hour until the discharge is checked, will generally give relief. If the nose and head are stopped up and are hot, dry and feverish, aconite, in the same proportions and size of dose, should be used. The bowels should act freely. A heaping tablespoonful of the sulphate of magnesia (salts) should be taken every two hours until there is free action of the bowels.

Heat applied to the ear, as a bag of hot water, sand or salt, or hot flannels, will usually give relief. It will shorten our story and give the suffering needed information to say that in acute, painful affections of the ear steam or heat may be used in any form. Douching or syringing the ear with hot water is good treatment. If a fountain syringe is used, hang it but one or two feet above the patient's head, that the force of the stream against the drumhead shall not cause pain, and use from a pint to a half gallon of water as hot as can be borne. This may safely be repeated every hour until permanent relief is given. After the douching or gentle syringing, the canal should be dried carefully, using no violence, and something warm and dry put over the ear until the pain returns, when the douching should be repeated.

When there is much pain and heat or fever, free the bowels with salts, as before directed, and use the hot footbath, and if no relief is obtained it will be best to consult a physician. The chances are that there is pus (matter) in the middle ear cavity and that the drumhead will have to be opened to let it out. We repeat that the time to treat the ear and to prevent deafness is early in the disease. In childhood a great deal can be done and a very large majority of the cases can be cured. The doctor who advises letting the ear alone to get well itself does not understand ear diseases. Experience has proved that letting them alone is disastrous and that intelligent treatment and care

at the proper time very often prevent deafness and save many lives.

Foreign Bodies.—If an insect, bean, grain of corn, or other foreign body, gets into the ear, do not push it in further, but go immediately to a competent physician. Do not try to get it out with a hairpin, knitting-needle, toothpick or similar instrument. At most only syringe with warm water, a device that is likely to prove effective if the nozzle is very small and the foreign body is so located as to permit getting behind it. An insect in the ear can usually be made to crawl out by filling the ear with warm water, the patient lying with his other ear to the pillow.

THINGS NOT TO BE DONE.

Do not pick the ear unless you want to make it sore. It should be scratched only with the elbow. If it itches intolerably an examination should be made by a competent physician. There is something wrong that can be righted by proper treatment.

Do not slap a person severely upon the ear with anything unless you want to rupture the drumhead by a sudden compression of the air in the auditory canal.

Do not pour oil or other substances into the ear without cleansing soon afterward unless you want to make a nest for germs and set up inflammation.

Do not permit a child to breathe through its mouth unless you want it to get deaf. Mouth-breathing is a habit caused by some obstruction of the nose or throat, and is a fruitful cause of deafness by creating disorders that are conveyed by the Eustachian tubes to the middle ear. If necessary, to break the habit of mouth-breathing, bind a cloth over the mouth and thus force the patient to breathe through his nose.

Do not let a discharge from the ear continue weeks or months, thus becoming chronic.

Do not try everything for a sore ear or eye that everybody tells you. Anyone can tell you to do something, and the less he knows the more he can tell. It requires knowledge to simplify. But little of the right thing is needed. A little of the wrong thing may do great mischief.

CHAPTER IX.

INTESTINAL PARASITES.

WORMS.

A great many parasites have been found in the intestines of man, but so many of them occur so rarely that it is necessary here to consider only four classes: The Tape Worm, Round Worm, Thread Worm, and Trichina.

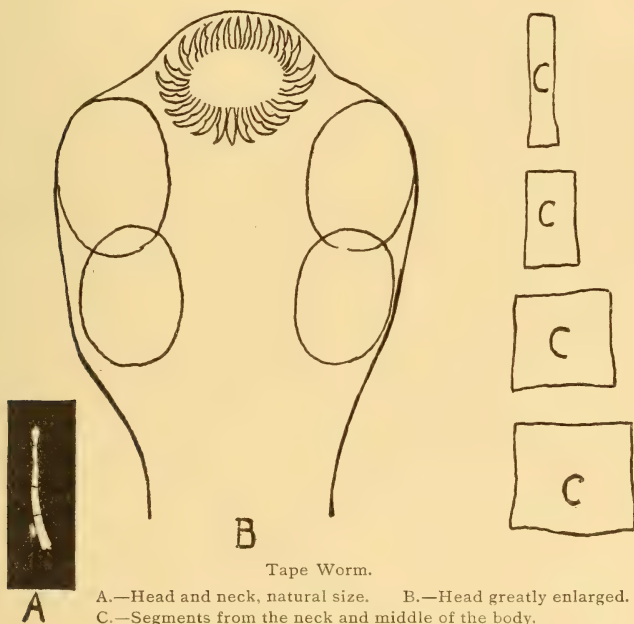
THE TAPE WORM.

The tape worms or cestoids belong to the genus *tænia* and constitute a numerous family. Two hundred species have been described, ranging from a tiny form scarcely visible, to a creature an inch in breadth and a hundred feet in length. They all live in the intestines of vertebrates, but only a few varieties have ever been found in man. They have been known from very ancient times, yet only recently has their mode of reproduction come to be understood.

An egg of a tape worm never hatches in the intestine in which that worm lives, but must first be taken into the stomach of some suitable animal, where, with the aid of the gastric juices, it is changed into an embryo infinitesimally small, which bores its way into neighboring tissues, or into a blood vessel, whence it may be carried by the circulation to any part of the body. Having finally lodged, it develops into a larva, becomes encysted in the tissues and, unless suppuration results, may remain dormant there for years, with little or no inconvenience to its host, provided that as the cyst increases in size it does not press upon any very sensitive or vital part, and does not become very large. A cyst thus resulting from the development of the embryo of a tape worm is called a hydatid. It sometimes contains more than one embryo, and ranges in size from the bulk of a small pea to that of a child's head, but the embryo itself remains exceedingly minute.

Measly pork is pork containing these hydatids. Heat destroys them, but the man or other animal that eats raw or only partially cooked meat containing hydatids becomes infested with

tape worms. The hydatids are frequently found in cattle, hogs, sheep, dogs and other animals, and not very rarely in man. There are recorded about a hundred cases of death from the invasion of the human brain by echinococcus, a variety of hydatid, and for which, when located in a vital part, especially the brain, no cure is known. Safely encysted in the muscular tissues of a healthy host, a larva may live from three to six years, then die and be absorbed or undergo calcareous degeneration, but if at any previous time its host be eaten by another animal, this embryo will become active and, passing through the stomach, will attach itself to the mucous lining of the small intestine and grow so rapidly as to become a full sized tape worm in from three to eight months.



The head of a large worm is often only about as large as a pin head, is round, and furnished with two, four, or more suckers, or hooks by which it clings, but has no mouth, the animal deriving its nourishment by absorption, or, more exactly, by ex-mosis, from the intestinal juices in which it lies. It is never found attached except in the small intestine; the contents of the larger bowel will not sustain it. The very small and slender neck gradually broadens to the segmented body, which usually reaches

a width of one-third of an inch, or even more, and a length of twelve to thirty feet, and consists of from 400 to 1,200 segments or joints of various proportions, but generally longer than they are broad, though in a variety derived chiefly from fish they are shorter than their width, except those near the neck. Each joint fits into the one next behind it and each is attached to the next more feebly as distance from the head increases, until at the rear end they separate very easily and are then voided with the feces. Each of the oldest of these segments, up to about the four hundred and fiftieth from the head, is sexually mature and contains, besides both the male and female organs of generation, membranous sacs packed with eggs, a single segment often containing as many as 30,000 of these exceedingly minute, but perfectly developed ova. It has been estimated that a single worm produces over 50,000,000 of them per year, also that the chances of development, i. e., of an egg reaching a suitable stomach in which to hatch, of the larva gaining a lodgment in suitable tissues, and later through another stomach of reaching an intestine in which to fully mature, are only one in many millions. With intelligent care this possibility can be reduced much more, for as heat destroys the larva, he that eats no raw meat is not likely to ever be troubled with a tape worm. As much, however, cannot be said of the danger from the formation of hydatids. Beyond cleanliness and care to partake only of clean food and pure water, there is no way to guard against taking these minute eggs into the stomach that begins to be as effective as the prevention of their formation by protecting all domestic animals as far as possible from becoming infected. (See "Precautions.")

The head is all of the worm that is essential to its life. As the body grows one segment after another is formed at the base of the neck, the oldest joint always being the furthest from the head, and as any number of them may be broken off without in the least impairing the formation of new joints, the only way to get rid of the worm is to get rid of its head. If let alone it may live for ten years, or even longer.

Symptoms.—As sections of the worm become separated from the rest of the body they are voided with the feces, or passed unconsciously to the patient, and the first intimation that he has that he is carrying a tape worm may be his seeing these sections in his feces, or finding them in his clothing. On the other hand,

a mature tape worm in the intestinal canal may give rise to such disturbances as vertigo, noises in the head, impaired sight and hearing, itching of the nose and anus, salivation, loss of appetite, alternate constipation and diarrhea, colic, sensation of weight in the abdomen or of something moving in the bowels, pains and lassitude in the limbs, headache, night sweats, palpitation, cramps, and sometimes even hysterical fits, chorea, convulsions and mania. The worm produces no poisonous secretions or excretions, and it is probable that nearly all the symptoms are only results of nervous reflexes aroused through irritation of the intestine by the presence of the worm.

The symptoms are never all present in any one case, and as most of them may also be associated with other disorders, the only positive diagnosis is from finding parts of the worm. For this purpose, in suspected cases, examination of all the feces should be made, care being taken to distinguish any supposed segments of tape worm from shreds of mucous membrane, which in certain diseases are also passed with the stools.

Let it be remembered that the really serious danger is not from the worm in the intestine, for that can easily be expelled, but from getting its eggs into the stomach, there to hatch into the larvæ that shall find their way by the blood into the lungs, liver, eye, brain or some other organ and, by the development of hydatids, produce most serious results. Hence all examinations of segments of a tape worm should be made with great care not to contaminate the hands, and all such segments, together with the feces in which they are found, should be thoroughly disinfected or destroyed by fire. It is claimed that under favorable conditions the eggs may retain their vitality ten years, and then, if taken into a stomach, undergo development.

Treatment.—Two days of preparatory fasting are necessary, during which the patient should eat very sparingly and only of milk, beef tea, white bread and such other light food as will produce little residuum. A mild cathartic, such as a dose of castor oil or salts, should be taken on the evening of the second day to thoroughly cleanse out the bowel. The expelling medicine should then be taken on the following morning. Maryott says the following remedy, if taken after such preparation and exactly as directed, will accomplish the work with absolute certainty and without danger to the patient.

Extract of male fern ethereal.....three drams.
 Pure chloroformone dram.
 Emulsion of castor oil.....two ounces.
 Croton oiltwo drops.
 Syrup of spearmint.....one ounce.

Shake thoroughly and take one-half on an empty stomach the morning of the third day of preparation, and after thirty minutes take the other half, lie quietly while the medicine is doing its work and when the bowels act the worm will be found in the stool, and the drowsiness caused by the drugs will soon pass away. If the head is found the patient can be sure that he is cured, although if very nervous or hysterical he may imagine for some days that he is still experiencing the old symptoms and has received no benefit. It is quite rare for more than one tape worm to occupy the same intestine at the same time.

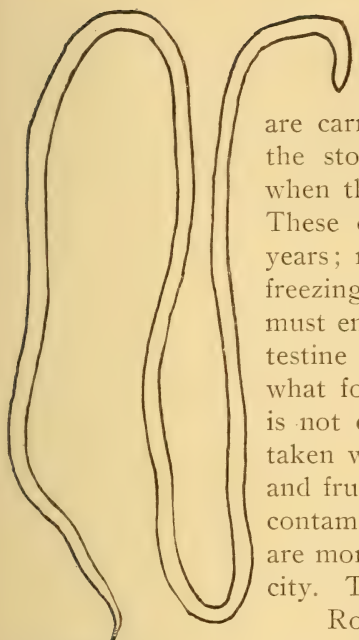
The seeds of the common pumpkin are also often used as an expelling remedy, but the preceding prescription is considered more reliable. If the latter is preferred, bruise an ounce of the seed kernels into a paste, add a half ounce of syrup of spearmint and two ounces of hot water, and drink as hot as can be borne, in the morning upon an empty stomach and after the preparation as before indicated.

ROUND WORMS.

(*Ascaris Lumbricoides*.)

The round worm is the most common of all the parasites that infest human intestines and, next to the tape worm, is the largest. It is round, non-segmented, tapers toward both ends, but more gradually toward the head, is of a dirty yellowish red or light brown color, and much resembles the ordinary earth worm. The female is twice the size of the male, is about as large as a turkey's quill, and is from ten to eighteen inches long. The mouth is bounded by three thick lobular lips and cannot injure the mucous membrane of the intestines, some of the symptoms attributed to the worms probably being due to their acrid excretions.

Not more than five or ten worms usually trouble a person at one time, but they may be present in great numbers and a case is recorded in which there were 2,500 in one patient. They are also found in the intestines of horses, cattle and other domestic animals.



Round Worm (natural size).

The female lays upward of 60,000,000 eggs per year, an average of more than 170,000 a day, and as these are carried from the bowels with the feces, the stools must always abound with them when there are any worms in the intestines. These eggs may retain their vitality many years; neither soaking in water, drying nor freezing injures them. It is thought that they must enter the stomach and pass into the intestine before they can fully develop, but in what form, whether as eggs or as embryos, is not certainly known. They are probably taken with uncooked food, as lettuce, celery and fruit, or in impure water, especially that contaminated with privy sewage. The cases are more frequent in the country than in the city. The heat of cooking destroys the eggs.

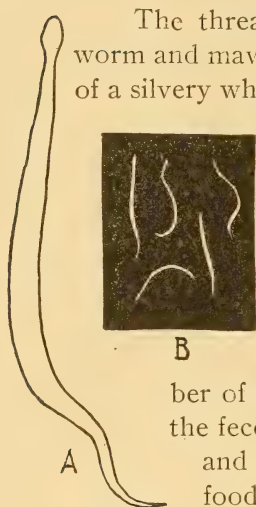
Round worms find their favorite home in the middle or lower part of the small intestine, but they are prone to wander and to crawl into any small passage they may find, and may make their way into almost any part of the body connected either directly or indirectly with the intestinal canal, as the stomach, gall ducts, gall bladder, hepatic ducts, pancreatic ducts, throat, nares, and Eustachian tubes; they may escape through the anus, and they sometimes crawl from the mouth and nose, provoking violent vomiting, coughing or sneezing.

Symptoms.—To a healthy person a few round worms may do no apparent harm, but in a delicate person, or in large numbers in anyone, they may, in addition to most of the symptoms of tape worm, cause severe pain in the abdomen, dilated and often unequal pupils, dark and sometimes swollen eyelids, grinding of the teeth, foul breath, troubled dreams, etc. Finding some of the worms is strong indication of more inside, but a positive diagnosis can be made only by finding eggs in the feces, by the aid of the microscope.

Treatment.—The best remedy is santonin. To a child it should be given in doses of one to three grains twice a day; to an adult in doses of three to five grains with the same frequency, and

to both on the third day of treatment a dose of castor oil should be given. The tape worm remedies have very little effect upon round worms. As preventive measures, use care as to cleanliness of the hands and fingernails, partake only of well cooked food or fruits that have been well cleansed, and water that has been boiled or properly filtered, unless certain of its purity.

THREAD WORMS.



Thread Worm.
A.—Greatly enlarged.
B.—Natural size.

The thread worm, known also as the pin worm, seat worm and maw worm, is slender, a half inch or less in length, of a silvery white color, and one of the most common intestinal parasites the world over. It is most often found in children and the uncleanly, but may occur in adults and in all classes of people. It infests the upper end of the large intestine, the cecum, in great numbers, but is sometimes also found in the small intestine. The females descend to the rectum and deposit there an immense number of eggs, which, having reached the ground with the feces, and dried, are carried far and near by winds and other agencies. Some of these upon uncooked food, as vegetables and fruits, and in other ways, are taken into the stomach, whence, having been quickened by the digestive fluids, they pass into the intestine and down to the cecum, where they fully mature in about fifteen days. The greater frequency in children and the uncleanly is probably due to their scratching to relieve the intense itching at the anus, the fingers thus becoming contaminated with eggs, then borne to the mouth or used in handling food. The female, having crawled from the intestine, sometimes deposits her eggs upon the skin and hair of the parts bordering the anus, and the bedding and clothing thus become infected. By sleeping with a patient, a healthy person is very liable to become infested, and the danger is increased by eating while in bed.

When either dry or frozen the eggs retain their vitality a long time, but soaking in water a few days destroys them. They seem to hatch only when they have entered a stomach. Cases are recorded in which the worms were so numerous as to cover the walls of the cecum like fur.

Symptoms.—As long as they remain in the upper part of the intestine these worms cause no symptoms, but their presence in the rectum is announced by intense itching in the anus, sometimes so severe as to become burning pain. This is likely to be most troublesome at night, and in either sex may cause abnormal sexual excitement, sometimes leading to masturbation. Worms are likely to appear in the stools. Should any doubt exist as to the cause of the disorder, the diagnosis can be made positive by a microscopic examination of the feces for the eggs.

Treatment.—By entirely preventing self-infection, it is probable that all the worms will pass out in a few weeks and the affection thus run its course, but in severe cases treatment is required. As many of the remedies used are likely to be absorbed in the intestine before reaching the part containing the worms, the condition is sometimes a hard one to cure. First give a dose of castor oil containing a few drops of turpentine, and, when the bowels have been emptied, administer a large injection of strong suds made with castile soap and containing a little turpentine, the patient occupying the knee and elbow position or lying on his back with the hips higher than his head; at the same time all the rectal folds near the anus should be well washed. A little mercurial ointment will relieve the itching. The injections should be repeated from day to day until the symptoms disappear, and care should be taken meantime to guard against reinfection.

TRICHINOSIS.

Trichina spiralis is the name of a species of very minute hair-like worms occasionally found in an encysted state in the muscles of man, also in those of the cat, coon, skunk, badger, and many similar animals, but occurring by far the most frequently in the muscles (lean meat) of the hog and rat. When the young spirally coiled worms first appear in the tissues they are so small as to be scarcely visible to the naked eye, often being less than one-six hundredth of an inch in diameter, but, becoming encysted and gradually increasing in size, they attain a length of from one-fiftieth to one-twenty-fifth of an inch, and presently the cysts become impregnated with a limy substance that gives them the appearance of little white specks which can be plainly seen.

In this condition the embryo usually remains dormant the rest of its life, which may be for ten years or more, but if the flesh

containing it be eaten raw by a suitable animal, the embryo is set free by the digestive processes, enlarges to about one-twentieth of an inch in length, develops rapidly, becomes sexually mature in two days, and in five or six days the female gives birth to great numbers of young embryos, then in four or five weeks perishes, having completed the cycle of its life. In what way the young embryos reach the muscles far distant from the intestinal canal is uncertain, but it is probable that they bore their way into blood-vessels and are then carried in the circulation to the parts they are to inhabit, where, having lodged in small capillaries, they make their way a little distance into the tissues, and each having penetrated the sheath of a muscle fiber encysts itself therein—a process that not only destroys the fibers, but tends to paralyze the muscles of which they are parts. There may be only a few of them, but sometimes they are present in enormous numbers. Leuckhart calculated that a single ounce of cat's flesh examined by him contained 325,000 trichina. The disturbances caused by a very great number of these embryonic worms in the muscles constitute trichinosis.

In the encysted state they are very tenacious of life, and the processes for preserving meats, as salting, pickling, smoking and freezing, do not seem to affect them. They are, however, susceptible to heat, and thorough cooking destroys them. In Germany and other European countries where trichinosis is very common, the people are much given to eating food composed at least in part of raw or only partially cooked hashed pork. No one will ever have trichinosis who never eats any but well cooked meat.

Symptoms.—At first the symptoms resemble those of cholera morbus, and there may be great prostration, then as the embryos enter the muscles there are rheumatic pains, swelling of the limbs but not of the joints, and contraction of the limbs. With the earlier symptoms there may be fever, the temperature often reaching 102 to 105 degrees. If the patient is to recover he generally begins to improve within three weeks. Death may result from diarrhea and exhaustion or from paralysis of the respiratory muscles.

If only a moderate number of trichina have been introduced into the system there will be hardly any disturbance of health, and from a short time after they become imbedded in the muscles they are not likely to cause any inconvenience. The more frightful

symptoms occur only when from large masses of trichina taken into the stomach the still larger masses of embryos enter the muscular tissues. If favorably situated a brood of these parasites act like poison, and a large dose of them is sure to kill.

Treatment.—Beyond the prompt use of thorough emetics, cathartics and injections, very soon after eating raw pork that has come to be suspected, very little can be done for trichinosis. If the patient has vitality enough to survive the ordeal from the birth of the embryos until they become encysted in his flesh he will recover. To this end such measures should be employed as tend to quiet nervous symptoms and sustain the strength as long as possible.

PRECAUTIONS.

Since the United States government began its system of meat inspection it has found that from one to two hogs in each hundred killed at the large abattoirs are trichinous. As every portion of the offal in such institutions is made into by-products through processes of which thorough cooking is a prominent part, all the ova, cysts and embryos contained therein are destroyed. Were all the meats that are used for food prepared at such places, trichinosis would soon be greatly diminished, if not entirely stamped out.

Small slaughter houses with incomplete equipment, unable to work up all their offal, make a common practice of feeding it to hogs. Any hog or rat that eats scraps of refuse containing trichina itself becomes trichinous and, as, by the law of proportions, some of the hogs slaughtered at these places are sure to be infested, many of the hogs that feed upon the offal will become diseased.

By a series of investigations Prof. Stiles, of the Bureau of Animal Industry, to whom we are indebted for many facts bearing upon this subject, ascertained that 55 per cent of the rats living upon the refuse of such slaughter houses are affected with trichinosis, and it is not probable that its proportion is smaller in the hogs that are fed upon the same food. Scarcely less perilous than the custom of feeding animal refuse to hogs is the tolerance of rats at slaughter houses, where 55 per cent of them become most dangerous agents in spreading incurable disease, inasmuch as a hog that eats a slaughter house rat stands fifty-five chances in a

hundred of becoming infested with trichina. While it is true that hogs will not always eat rats, they sometimes do, and it is likely that under certain conditions all would. Nor is this danger confined to the slaughter house yards, for, spreading to the neighboring farms, these rats become a menace to the hogs of the entire community, and, indirectly, to its inhabitants as well.

But trichinosis is not the only danger at the village slaughter house. Of each hundred hogs and cattle killed there, one or two is probably tuberculous; the offal of these subjects transmits the disease to the animals eating it, and when in turn their flesh comes to be used as food it is likely to transmit tuberculosis to human beings.

The dog is another menace. Although he seems to be trichina proof, by eating slaughter house refuse he often becomes infected with various other parasites, of which the following are the most important: The *Echinococcus* hydatid, found in the liver, lungs and other organs of cattle, hogs and sheep. This cyst contains numerous embryos or tape worm heads, and, when eaten by a dog, each head becomes a tape worm, whose millions of eggs are scattered by the dog in pastures and elsewhere on the farm, some of which will find their way into the stomachs of domestic animals and from their flesh be transmitted to man. In Iceland, where each family keeps eight or ten dogs and literally lives with them, about one-seventh of the people have *echinococcus* worms; and in Abyssinia, where the inhabitants use no privies and eat their beef raw, often so soon after it is killed that it is still warm, the prevalence of tape worm is so great as to sometimes be considered epidemic.

The thin-necked bladder worm, and the *Gid* worm found in the brain of sheep, if eaten while in the larval state by dogs, develop into tape worms that produce numerous eggs to be scattered over farms and infect the unfortunate animal that chances to swallow one with its food; and the tongue worm found in the viscera of cattle and sheep is transmissible in the same way to domestic animals and to man.

More than to anyone else these facts are of concern to the farmer, for although he can, as well as his city friend, by careful cooking, guard against the parasitical infection of himself and family, the value, health and sometimes the lives of his domestic animals are jeopardized by the village slaughter house. It should

be placed under strict statutory control. No slaughter house should be permitted where it will drain into a small stream or ravine and, by polluting its waters with disease germs, endanger animals and men living down the stream; its offal should never be fed to hogs, or left within reach of dogs, unless it has been thoroughly cooked; and its rats should be destroyed. A dog should never be permitted to eat a rat. The farmer who dresses meat for his own use should burn the offal or thoroughly cook it before allowing it to be eaten by hogs, cats, or dogs.

Privy sewage, the contents of privy vaults and hog manure should never be used on ground to which cattle, sheep and hogs have access, nor upon land that is to be planted to vegetables that are to be eaten uncooked. Raw vegetables and fruits should never be eaten until thoroughly washed and rinsed.

DISEASES OF CHILDREN.

By THEODORE W. PEERS, M. D.

CHAPTER I.

It is said that no other animal comes into the world as helpless, and remains in a dependent condition as long, as the human being. This helplessness renders it particularly liable to disease and accident, and we find infancy and childhood a period of special danger.

Not only are there diseases to which children alone are subject, but the disorders which may occur at any period of life are, most of them, very common among the little ones. With disease so frequent, and children unable to resist as stronger adults can, we should expect to find the messenger whom we all dread entering our homes most often for the babies. And such is the case.

Let us suppose that one hundred infants are born to-day. Before one month has gone, the lives of ten will have returned to the God who gave them. At the end of a year we count and can find but seventy-four. Another year goes and there are sixty-six left. One-third of all the children born die before they are two years old. At the end of five years we count again and find fifty-nine. To put it differently: Of every five children only three reach the age of five years.

We begin in this way, hoping to impress the gravity of our subject and to secure for it careful consideration. What can better show the importance of a knowledge of the diseases of children than such a plain statement of facts, unless it be to add another fact, in which the best qualified physicians agree, viz., that about half of all the infants that die might be saved if their parents knew how to properly care for them.

The first thing to know about disease is to know when a person is free from it, and the first thing to be known about the diseases of children is to know when a child is well. Our first consideration therefore is:

A HEALTHY CHILD.

When a baby first comes into the world several most important changes occur. While the mother is carrying the child it gets all its nourishment from her blood. Her heart sends the blood into its heart and body, and her lungs purify it as it comes back from the baby's body. Its lungs are not in use, and its heart does not act as it will after birth. Except in very rare instances, the bowels do not move before birth, neither do the kidneys.

As soon as a healthy child is born, it begins to breathe and, usually, to cry lustily. In this way the lungs commence, for the first time, to take in air and to purify the blood, which the heart now begins to send into the lungs, and into the other parts of the body; and the baby takes up its battle of life, an individual.

At birth a child is usually partially covered with a very soft, white, sticky substance called vernix caseosa. This varies greatly on different children. In one case the babe will be completely covered, and in some places, usually the small of the back, to a depth of nearly an eighth of an inch. Another baby will be almost free from it—only showing traces of it in the folds of the skin under the knees, in the groins, on the neck, under the arms, or in the folds at the elbows.

A perfectly healthy baby is of a pinkish or red color all over its body; but it frequently happens that, right at first, the breathing is not perfect, or the circulation is not thoroughly established, and we then have a white or bluish white baby, for a day or two, until the normal healthy pink color comes.

SIZE AND WEIGHT.

The average length of a girl baby is nineteen and a half to twenty and a half inches, and of a boy it is from twenty to twenty one inches. Dr. Holt, from a record of 1,158 infants, gives the average weight of girls as 7.16 lbs., and of boys as 7.55 lbs. These statistics are for hospital babies and are a little small. For the babies of those likely to read this book, I should say that 7.5 lbs. for girls and 8 lbs. for boys would be about right. Let it be remembered that these are averages and are made from healthy children who may have varied from 5 lbs. to 14 lbs., and that while averages are desirable, too much stress must not be put upon them.

SHAPE AND PROPORTIONS.

A baby at birth has a proportionally large head, small chest and big abdomen. The body is shaped something like an egg, the chest representing the small and the abdomen the large end. The arms are small and the legs still smaller, as compared with the proportions of an adult. The head is often out of shape at first, but, unless something is wrong, assumes the proper rounded appearance in two or three days. A healthy baby should be covered evenly with fat, giving it a well rounded, somewhat fleshy appearance.

If, then, your child is pink and plump, from sixteen to twenty inches long, weighs from six to fourteen pounds and cries lustily when it first comes you may be reasonably sure that you have a perfect, healthy baby.

MATERNAL IMPRESSIONS.

The doctor or nurse usually looks the child over to see if there are any blemishes, and if this has been neglected attention should be called to it. Fortunately it is of rare occurrence that a baby comes into the world seriously deformed, and when deformed in a way to seriously cripple its usefulness it does not, as a rule, live more than a few days. Red or purplish discolorations of the skin, commonly called birth-marks, are more frequent, but not disfiguring or important, unless upon the face.

These marks are usually supposed to be caused by some fright or shock received by the mother while carrying the child, and there are numerous cases that can be best explained in this way, but I want to impress the fact that, where one mother marks her child, thirty others have each expected that her baby would have certain marks, only to find, at birth, that it was not marked at all. In my own practice perhaps a hundred women have anxiously asked me: "Doctor, is the baby marked?" then described some event which they thought would produce that result; but not one of them was right. In only one case was the child marked and in this one the mother had not expected it. She had rescued from a savage dog a little child, the left side of whose head and face was covered with blood. Her baby boy, born five months later, had a purplish red mark on the side of his face and head which corresponded closely with the blood upon the injured child.

Maternal impressions undoubtedly are sometimes causes of

malformations, therefore women should be careful, especially during the early months of pregnancy; but a mother so seldom marks her child, even after a severe shock, that it is folly to worry over a fright received during pregnancy.

TRAINING.

Suppose now that we have this healthy baby in our family, what shall we do with it? What a helpless little thing it is! Our hearts warm toward it for this very reason, and the father or mother within us yearns over it. We resolve that it shall have better care and opportunities than we had, or at least shall have the best that we can give. Well, it will need care, just lots of it every day, and sometimes night, too. It will tire out its mother many, many times, and if its father is a father it will often tire him out also. Yes, your baby will train you whether you train it or not, and that suggests: What shall we do with the baby?

Let us train it. Of course you know the meaning of "train," but it should have a new, fuller and more definite meaning to you now than ever before, so we will define it. To train is "to bring or raise to a definite standard, as of conduct, knowledge or skill, by protracted and careful instruction and practice." Another definition is, "to bring into a required physical condition by means of diet and exercise." To properly train a baby then is to carefully instruct it and have it do things for so long a time that we shall eventually bring it to the standard that we think a baby ought to reach. Its accomplishments should include conduct, knowledge, skill and physical condition. Our part has to do with the physical condition and to that we will direct our remarks.

Some wise man has said: "Give me the first five years of a child's life and I will fix his religious belief." Applying this to our subject I say that the physical training a child gets during his first five years usually determines his after life. When should training begin? Dr. Holmes said it should commence two hundred years before the child is born. This statement sets forth a most important truth in a striking manner, and let us not forget that we may have a part to play in the history of the world two hundred or more years hence.

But the baby we are talking about is here and our training of it can only begin now. It is astonishing to one, who has not

been used to a baby to see how soon it can be trained to do certain things. Before it is a week old it knows that it is nice to be held and that crying will get more people to hold it.

The foundation principle in the training of infants is regularity, for habits are thus formed, and it is largely on habit that we must depend. Regularity is the watchword, and the following order is suggestive: Nursing, sleeping, bathing, holding, defecation, temperature and exercise.

NURSING.

Regularity in nursing is very important for two reasons: Because it aids and establishes proper digestion and because it helps to keep the flow of milk regular in quantity and quality. Digestion is the process of so dissolving food that it can be assimilated by the blood and used to build up the body. In the digestion of the milk a child takes, it is first curdled, then gradually dissolved and assimilated. This process takes nearly two hours for human milk and almost three hours for cow's milk, hence a baby should not nurse at closer intervals than two hours. When cow's milk must be used a still longer time should intervene.

We must think of digestion as a chemical process requiring a certain length of time, and remember that it should be completed without interruption. What would a cook say to putting a custard pie into the oven and, when it was half done, pouring in more of the raw material? This is not an exact parallel, but illustrates the point. If food be taken at regular intervals and time enough be given for its digestion before any more is taken, the stomach will be trained in such a way as to usually do its part. But if food be taken at the whim of the child, or the convenience of the mother, the stomach will rebel and indigestion will soon annoy the baby.

The following table shows the frequency and average amount for babies at different ages:

Age of Infant.	Intervals.	Times in 24 hrs.	Amount per Meal.	Amount in 24 hrs.
1 week	2 hours	Eleven	1½ ounces.	15 to 20 ounces.
2 to 3 weeks	2 "	Ten	2 to 2½ "	20 to 25 "
4 "	2 "	Ten	2 to 3 "	25 to 30 "
6 "	2½ "	Eight	4 to 4½ "	30 to 35 "
8 "	2½ "	Eight	5 "	35 to 40 "
3 to 5 months	3 "	Seven-Six	6 to 7 "	40 to 45 "
6 to 12 "	3 "	Six-five	7 to 8 "	45 to 50 "

When a baby is less than a month old it needs only about a pint of milk in twenty-four hours, but by the time it is a year old it needs three pints, and it is an interesting fact that the mother furnishes only the amount the baby needs, no matter what its age. The milk varies, too, in its constituents, as the baby's needs require, and as its powers of digestion increase. But this is true only when the child is nursed regularly and the mother cares for herself properly. If the child nurses too frequently, the milk becomes smaller in quantity and stronger in albuminoids, or flesh forming food, and is more likely to disagree with it. Irregularity makes the flow and quality of milk differ. We therefore see the importance of nursing with sufficient and regular intervals.

The flow of milk can be increased in several ways: First, by the mother taking large amounts of fluid, either alone or with her food. Water alone will increase its quantity, and but slightly change its quality. The best time for drinking it is a half-hour to an hour before, and from one to two hours after eating. If water is taken at meals it should be while the mouth is empty. It should not be used to wash down food.

Milk will also increase the quantity of milk and, if it agrees with the mother, is an excellent food for her. If cold milk disagrees it is well to try it hot, as some can digest it in that form readily who cannot if taken cold. Adding a little salt is sometimes a help, and occasionally, diluting with hot water, one part of water to two of milk, is an advantage.

Coffee and tea increase the flow, but principally on account of the water they contain. Cocoa or chocolate seem to have real milk-producing qualities and, where the mother likes it and it agrees with her, it is well for her to take it in place of tea and coffee. There are times when benefit is derived from the malt extract preparations. They sharpen the appetite, aid digestion and sometimes directly increase the flow of milk. The thick extracts, such as Maltine, Trommer's malt, etc., have more nutritious properties and also aid in the digestion of starchy food. The liquid extracts contain alcohol and carbonic acid and are more pleasant than some to the taste, but have few if any digestive properties and very little food value.

Few, if any, drugs can be relied upon to increase the flow of milk. If the mother is not well, medicines, by increasing her digestion and blood supply, are benefits, but more by their action upon the general health than by their effect upon the milk.

Human milk is stronger in proteids when the mother takes little exercise than when she is busy. If the baby's passages show curds, and it has colic and indigestion, the mother can, at times, correct the difficulty by taking more exercise. Nothing is better for this purpose than walking in the open air. If her milk is lacking in fat, she can increase it by using more proteid food; such as meat, fish and eggs.

If for any reason it becomes necessary to "dry up the milk," or decrease its flow, the mother should follow the opposite course from that suggested to increase it, using little fluid, either as drink or food, and rather small amounts of food of any kind. Her bowels should be moved freely with Epsom or Rochelle salts. An ointment of a teaspoonful of tincture of belladonna, a teaspoonful of spirits of camphor and a tablespoonful of lard should be made and a half teaspoonful rubbed on each breast two or three times a day, care being used not to touch the nipples. If the pupils of her eyes enlarge it should be discontinued. A bandage, eight or ten inches wide, should be wrapped around the body under the arms and pinned as tightly as can be easily borne.

SLEEPING.

For the first three months of the baby's life it should do little but eat and sleep. Unless it sleeps a large part of the time, the probabilities are that it is not well, or at least not comfortable. For the first month it should sleep about twenty hours out of the twenty-four; at three months it should have twelve to fifteen hours sleep; from three months to a year about twelve hours; and from one to three years ten to twelve hours is none too much. An infant should be taught to sleep on its side, preferably the right side. There should be a regular time for sleeping, and this should be varied as little as possible. In putting it to sleep the mother should remember that it is a matter of habit and that she can train the baby to go to sleep by itself almost as easily as rocking it. Even were this not the case and it required much more effort to teach it this habit, it would still be worth while, for the saving of time and annoyance later. Sleep is easy for a baby, and by remembering two simple rules there will be little difficulty.

First. Be regular. Put it to sleep the same way, and at about the same time every day.

Second. When you attempt to put it to sleep, persevere until you succeed.

Some babies require more sleep than others, hence a little common sense must be used as to how much each one needs. The easiest times for a child to go to sleep are after eating or nursing, after a warm bath and after a vigorous play-spell. When it persistently wakes up cross and fretful, you may be sure that something is wrong; such as pain, too little sleep, hunger, or some disease.

A baby should not sleep with its parents, but in a bed by itself; and when it sleeps in the daytime should be put in its own bed, which should always occupy the same place. If there be difficulty in keeping the child warm, don't depend entirely upon more covering, but use artificial heat.

BATHING.

As a rule an infant should be bathed every morning, but there are a few whom bathing seems to chill and injure. The mother should notice closely, and if, after the bath, the baby's skin and nails have a bluish color, and the feet, hands and nose are cold and the child breathes fast and seems exhausted, it will be better to simply sponge it with warm water as often as cleanliness requires. Let the bathing be done quickly, in a warm room, and care be taken not to get the baby in a draft. Everything should be prepared before it is undressed, and a thermometer be used to test the temperature of the water, as the hand is not accurate enough. At birth the bath should be 99 degrees, and gradually lowered until at one month it is 95 degrees. From one to twelve months it should fall one degree for each two months, so that at one year it is 90 degrees. Some people need this temperature through life, but if the baby stands it well, and is warm and lively after the bath, the temperature may be reduced one degree every three months, so that at two years its bath is 86 degrees. Some children can stand even yet cooler water, in which case there is no objection to gradually reducing the temperature in summer to 75 degrees. As babies are individuals, no absolute rule can be made for all. If a child thrives with a cool bath use it; but if it depresses and annoys him use the warm one.

The face should first be washed in warm water, while the whole body is wrapped in a flannel blanket. The scalp should then

be washed with castile soap and dried with a soft towel. Next, sponge the body and extremities with a soapy sponge, using special care to cleanse the folds at the neck, under and about the arms, and the genitals and groins. The child should then be lowered slowly and gently into the bath tub filled with clear water, and, after the soap has been washed off, taken out, carefully rubbed and dressed, care being used to have the clothes warm. If the skin shows a tendency to soreness a dusting powder should be used, composed of equal parts of powdered corn starch and boracic acid. The morning is the best time for this bath and it should be given regularly at about the same hour each day, after which the child should be nursed and put to sleep.

HOLDING.

One of the delights of motherhood, and one of the greatest favors to visiting admirers, is holding the baby. Let this be done with care. Never lift a baby by its arms extended over its head, and especially do not lift it by one of its arms. If you must kiss it, let it be upon the cheek or forehead or, better still, upon the hand, never upon its lips.

DEFECATION.

This is a subject of so much importance that it must be considered. Many a patient is forced to consult a doctor because this matter did not receive proper attention in infancy. Just as a stopped-up sewer brings sickness to a household, so constipation brings illness to an individual. If the waste matter be not excreted it will be absorbed and poisons be drawn into the blood. As the best cure is prevention, the best remedy for constipation is regularity, from infancy, in emptying the bowels.

It is surprising how quickly some babies learn to attend to the calls of nature, and how regular they become by proper training. They have been taught to indicate their desire to evacuate the bowels when only four months old, and the added comfort and lessened work for the mother are so great that she may well make the effort necessary to train her child. It should be placed upon the chamber soon after its morning meal and, if the bowels are not soon emptied, a pencil of soap inserted in the rectum, or a rectal injection given of two teaspoonfuls of a mixture of one part glycerin and two parts water. Either treatment

is likely to cause prompt action. The soap pencil may be made from a piece of soap two inches long by trimming it into a tapering cylinder, whose small end is one-fourth inch and large end one-half inch in diameter.

The training of the bladder is not quite as easy and important, but is desirable, and efforts in this direction are often very successful. Here, as in the former case, regularity is the principal factor in the training.

TEMPERATURE.

Babies are very susceptible to changes in temperature, especially to cold, and many mothers make the grave mistake of supposing that when a child is cold they can warm it by adding covers. Let it be remembered always that a cold baby should never be warmed in that way, but in every case by applying heat. It is true that a baby's circulation is active and that at times it acquires warmth more rapidly than an adult, but this is not always true and, as a child takes cold so readily and its colds are liable to result so seriously, great care should be taken to keep the baby warm.

Here again regularity is the key note. Keep the baby and the room at as even temperatures as possible; that of the latter, when artificial heat is employed, at from 70 degrees to 75 degrees. It is not best for a child less than a year old to sleep in a cold room; but if it must do so some artificial heat should be placed in the bed, as a hot water bottle, a hot brick, or a bag of hot sand or salt. Colic is often caused in very small children by cold, and is immediately relieved by thoroughly warming them. The feet should be uncovered and well warmed by the fireplace or stove. Many teas are used for colicky babies, some of which have medicinal value, but the relief afforded by them is chiefly due to their being given warm. A warm baby is almost always a happy baby and one easy to care for and, if kept uniformly warm, digests its food better and grows faster than a cold one.

EXERCISE.

Few people pay any thoughtful attention to exercise for their little ones, yet, how important it is that they have the strong, healthy bodies which can be secured only through proper and systematic exercise. This is not the department in which to

give extended and minute directions as to its kinds and times, but a few general statements may not be inappropriate.

Exercise should be taken as largely as possible in the open air. If taken within doors, the room should first be thoroughly aired and, if not too cold, the windows should be open during the exercise. Exertion should be sufficiently vigorous to bring a healthy glow to the body, but not to tire, and never violent enough to cause exhaustion or strain. It should be regular, too, for it is the everyday work that tells. Many start vigorously, doing even too much, perhaps, for a week or two, then give it up entirely. The correct plan is to spend a certain definite time every day in exercise, keeping it up by the year. It is surprising what an improvement, in a child unaccustomed to it, fifteen minutes daily will soon make. The exercise should be varied and as pleasant as possible. It is far better if regarded as fun than if thought a task.

CHAPTER II.

ARTIFICIAL FOODS.

Of the many parts of our subject, this one is of the very greatest importance. There is more sickness and loss of life among infants because of improper food and feeding than from any other cause, if not from all other causes combined. Not only this, but in every illness from any cause, feeding is a most important factor of the treatment, often turning the balance between life and death. We have spoken of maternal feeding and shown how desirable it is for a mother to nurse her babe, and that it is better, not only for the child, but for her, to nurse it, at least a few times a day, if her milk is good, even if artificial foods must also be given. It now becomes necessary to show how a child should be fed, if, for any reason, the mother is not able to nurse it. So many infant foods are on the market, each pictured as the best, and so many different kinds will be recommended by well meaning friends, it is very necessary to be informed and able to act intelligently in this matter.

For convenience we will consider artificial foods as of five classes:

MILK.

1. Milk always contains about the same materials, no matter from what animal it comes, the main difference being only one of proportions. There are several animals whose milk is more like human milk than is that of the cow, the mare, ass and goat being among them; but cows' milk is so much the easiest to obtain it is most often used. The following is an average analysis of human milk and that taken from the cow:

	Reaction.	Fat.	Sugar.	Proteids.	Salts.	Water.
Cows' milk.....	acid	3.50	4.30	4.00	0.70	87.00
Human milk....	alkaline	4.00	7.00	1.50	0.20	87.30

From this comparison we see that the main difference between cows' milk and human milk is that cows' milk has TOO MUCH OF THE PROTEIDS AND NOT ENOUGH SUGAR.

We put this fact in capitals that it may not be forgotten, as it is the basis of all the modifications of cows' milk to make it fit for infants' food. Of the two ingredients, the proteids are, decidedly, the hardest to manage. They are the tissue-forming and strength-giving part of food and therefore valuable, but if present in too great quantities are not digested, and form irritating curds in the infant's stomach and bowels. This proteid material differs in the two kinds of milk, not only in quantity but also in quality. The formation of curds is the first step in the digestion of milk, and takes place upon its admixture with the acid of the stomach. This acid has been found to closely resemble hydrochloric acid. Now, if we add a little dilute hydrochloric acid to cows' milk we will find that it produces a hard curd (the so-called cottage cheese or *schmierkase* of the Germans); but if we add the acid to human milk it produces a curd consisting only of fine flakes, easily broken up and not one-fourth as great in amount as that from the cows' milk. We must understand, too, that not all of the proteids form curd; part of them remain in a soluble condition, and are therefore much more easily digested.

The question now arises: How can we modify cows' milk so that it will be good food for the baby? There are four ways:

1. Dilute with water and add sugar and cream.
2. Use whey with sugar and cream.
3. Digest the proteids with pepsin, pancreatin or papoid.
4. Dilute by adding some cereal or lime water to prevent a firm or hard curd.

No. 1. *Dilution*.—Various degrees of dilution have been suggested, most of which have worked well with some babies. If we add to a measure of cows' milk an equal amount of water (boiled and strained), we have in the mixture about two per cent of proteids, which is a little more than the average found in human milk, but in reducing the proteids we have also reduced the amount of sugar and cream (fat); hence we will have to add enough of these ingredients to get the right proportions. They can be very nearly obtained by using the following rule: One-half pint of fresh milk; one-half pint of water, one and one-half tablespoonfuls cream and two heaping teaspoonfuls of milk sugar. This is proper for a child six months old. For a younger child more water should be added, and as it grows older the water may be lessened, but not very much, as most infants thrive best when the milk is

diluted as indicated. Whenever small pieces of curd appear in the stools, they mean indigestion or too much proteids, and in either case the proteids should be lessened by adding more water. If the child be constipated, the addition of cream will often aid in correcting the difficulty.

It may be well to mention the necessity of procuring good milk. Cows' milk varies greatly, and while one cow gives a milk easy of digestion, that given by another may be difficult. The digestibility of any particular milk may be learned either by chemical analysis or by its effect upon the child. As an analysis is expensive most people rely upon the effect. There is a widespread belief that the milk from one cow is better for a child than is the mixed milk from a herd, but quite as generally it is believed by the profession that the mixed milk is preferable.

My own opinion is that if the right cow can be obtained it is better to have milk from her alone, but if one cow's milk that agrees with the child cannot be found, it is of course better to use milk from the herd. Milk fresh from the cow is decidedly easier to digest than when it has stood even one hour. A baby will at times retain and digest milk if the cow be milked every two hours and the milk fed to it at once, when, were the milk allowed to get cold before being fed, the child would vomit very soon after taking it.

The "strippings" contain more cream and less proteids than either the first milk or mixed milk, and where it can be done it is an excellent plan to keep the last quart separate for the baby.

No. 2. *Use of Whey*.—The whey of cows' milk contains little proteids, but as it is the proteids that usually disturb digestion in children, we sometimes use whey in feeding them, to tide over a dangerous period. A teaspoonful of sour wine is stirred into a half pint of fresh milk and when it has stood half an hour the curd formed is strained out. To the whey thus obtained are added a teaspoonful of milk sugar (cane sugar is not good) and a tablespoonful of cream; then it is warmed to 100 degrees and fed with a bottle or spoon. Sometimes a tablespoonful of fresh milk is added to supply the lacking proteids and the proportion gradually increased as the child's digestion improves.

No. 3. *Digestion of Proteids*.—We may take care of the casein (one of the proteids) in milk by wholly or partially

digesting it. This is done by putting into a bottle a pint of fresh cows' milk, one-fourth of a pint of water and a powder consisting of five grains of extract of pancreatin and fifteen grains of bicarbonate of soda; then placing it in a pail of water at 110 degrees, or as warm as the hand can comfortably bear. The milk begins to digest at this temperature and the process can be carried as far as the needs of the infant require. For one in ordinary health fifteen minutes is usually long enough. If digested more than this the milk becomes bitter and the child refuses to take it. The bitterness is due to the formation of peptones, and although it gives it a disagreeable taste it makes it easier to digest. If the milk be kept in warm water two hours the casein will be completely digested and the milk will not curdle when an acid is added. This process is a valuable one in certain emergencies and for a child under three months of age, but there is danger that the stomach so fed will not have enough to do to keep up the growth of its digestive powers. This artificial digestion can be stopped at any point, either temporarily, by placing the milk upon ice, in which case the digestion of casein can be resumed by warming the milk to 80 degrees or more, or permanently, by heating the milk until it boils, thus destroying the digestive ferment.

For convenience digestive tablets and peptonizing tubes have been devised, and can be procured at the drug stores, containing the soda and extract of pancreatin ready for use. Seeing the utility of this process, Fairchild, Bro. & Foster have prepared a peptogenic milk powder composed of the above ingredients with milk sugar added. This makes a preparation very much like breast milk and, in my hands, has proved a most excellent food for an infant less than five months of age. Directions accompany each bottle of the powder.

No. 4. *Cereals and Lime Water.*—Cereals are the foods obtained from various kinds of grain, such as wheat, oats, rice, barley and corn, and are made up very largely of starch. The term is also applied to the starchy foods derived from potatoes, arrowroot and sago. Until a child is from three to six months old he cannot digest starch and it should not be given him. It has been learned that milk mixed either with starchy material or with lime water will not curdle into as hard lumps, while being digested, as milk will if taken pure, and this principle

is often employed in preparing food for babies. The materials most often used for this purpose are oatmeal, barley meal, flour and corn starch, and they must always be very thoroughly cooked. Upon a heaping tablespoonful of any one of these, preferably oat or barley meal, pour a quart of cold water, then boil steadily for at least two hours, adding water from time to time, so that at the end there shall still be a quart. Strain through absorbent cotton or cheesecloth. Equal parts of this water and milk, with sugar and cream added as in No. 1, make an excellent food for infants over six months old.

CONDENSED MILK.

This is made in two ways. The oldest process is that of adding sugar and boiling the milk, then evaporating it to a semi-solid condition, the object of the sugar being to keep the milk from fermenting quickly after the can is opened. In recent years certain manufacturers have left out the sugar and simply evaporated the milk to a thick liquid consistency.

Much has been written about condensed milk as a food and there seems to be a great fondness for it among the laity, but chemical analysis shows it to be lacking in fat and to have too much sugar in proportion to its fat and proteids. It is evaporated to about one-fourth the weight of the milk, and as about twelve parts of water are usually added to one part of condensed milk, the result is the same as adding three parts of water to one part of fresh milk.

Although the sugar is liable to ferment, it is easy for a baby to digest, and a baby fed upon condensed milk usually gets fat and has a fair and clear complexion, leading the mother to think that her child is doing well; but doctors know that such children are especially liable to disease, and when sick are less likely than other children to recover. Dr. Holt says that he never saw a child that was raised upon condensed milk that did not show some signs of rickets.

Sweetened condensed milk is therefore not a suitable food for babies. It serves a very useful purpose when, for a time, an easily digested food is needed, as when the child is sick, or when one is traveling, or cannot obtain good cows' milk, or when the baby is less than two months old; even then cream, if it can be obtained, should be added.

Condensed milk without sugar is little more than sterilized cows' milk evaporated to one-fourth its weight; hence, after adding three parts of water it should be treated as was directed for cows' milk. Because of its liability to ferment in hot weather, condensed milk with sugar is better diet for winter than for summer.

MISCELLANEOUS FOODS.

Under this head we will speak of the prepared foods, which are principally of two kinds.

First. The Cereal Foods Partly Digested by Heat.—By cooking cereals a long time at a high temperature the starch is changed and rendered more easily digestible. Taking advantage of this fact, manufacturers have prepared and placed upon the market such products for babies' food. Mellin's, Ridge's and Imperial Granum belong to this class. Aside from the fact that some of them contain starch, their greatest deficiency is the small amount of fat they contain. Cream should therefore be added and they should be reserved for children over six months of age.

Second. Cooked Cereal Foods with Condensed Milk Added.—The addition of condensed milk slightly increases the amount of fat, but there is still a deficiency. Malted milk and Nestle's food are of this class.

A preparation has been introduced recently from Germany, called Gardner's Mother's Milk, which is an attempt to so manipulate cows' milk as to make it like mother's milk.

We are sometimes compelled to exercise all our ingenuity to find a food that the baby can digest. Many things besides the above have been tried with varying success.

Beef juice, obtained by cutting lean steak into small pieces and warmed enough to thoroughly heat it through, but not to cook it, then pressing out the juice with a lemon squeezer or press, is sometimes very useful.

The white of an egg beaten up in a glass of water is valuable, especially where vomiting is persistent.

Whey, made by adding a teaspoonful of sour wine or vinegar to a cup of milk, and straining, is also used. Unfermented grape juice is often very grateful, and koumiss is also good at times.

The subject of infant feeding is a very large one, and cannot

be treated exhaustively here; we have only attempted to give some general principles and to be specific enough to enable mothers and nurses to feed correctly in emergencies, but they must remember to consult a physician when possible as to which food is most appropriate for each child.

As already shown, digestion is a chemical process greatly aided by taking the food at proper intervals and in proper quantities. It should also be understood that the kinds of food must vary but little, and when the kind that agrees with the baby has been found, it should be relied upon and not changed except for cause. There may be a little variety occasionally to whet the appetite, but this is generally best done by a relish or dessert, given after the regular meal and in small quantity. By this method a child may be trained not only to eat the proper food but also to enjoy it. The numerous patients who come to the doctors complaining that they cannot eat this, that and the other wholesome and nutritious article of food, prove in so doing that when children they were not properly taught what to eat. Its individual taste is not the infallible guide to what the child needs. With proper training it may be taught to relish and enjoy most of the staple foods.

ADMINISTERING FOOD.

A few things should also be said in regard to the administration of food. Absolute cleanliness of food and of the utensils used in preparing and giving it is of the first importance. In country districts where the cow can be properly cared for, and the milk can be cooled quickly and kept cool, sterilization is not necessary unless the baby is sick. In a large city it is impossible to get absolutely fresh milk, hence all milk used there for babies should be sterilized. This may be done by boiling in a double kettle twenty minutes, or Pasteurized by keeping it for thirty minutes at a temperature of about 165 degrees Fahrenheit. The latter process is to be preferred, as it does not alter the milk in taste and chemical composition as much as the other method. After having been thus treated, the milk must be kept in air-tight vessels, as fruit jars, in a cool place until used.

Boiling water is the best cleanser and all utensils used for the baby should be boiled. Washing in warm water does not kill

the germs which cause disease. The nursing bottle should be rounded inside to leave no corners where the food can collect and prevent easy and thorough cleansing. After it has been used it should be boiled, then filled with a solution either of bicarbonate of soda, borax or boric acid, a teaspoonful to the quart of boiled water. A rubber tube should never be used and the nipple should always be a plain one. Several nipples should be procured at one time, and, after scalding, should be kept in one of the solutions above mentioned.

As it is best for the baby to take its food slowly, select nipples with small openings that will require ten minutes for it to get its meal. A little patience and tact will usually get it to nurse a bottle, although it may refuse at first. There is no objection, however, to feeding with a spoon. It is better not to give it from a cup, for, because of gulping it down too fast, the child is more likely to be troubled with indigestion.

DENTITION.

Dentition, or cutting of teeth, was once regarded as the principal cause of a number of diseases, especially diarrhea, convulsions, fever, and, at times, affections of the lungs; but, by the best authorities, it is now regarded as only occasionally a cause of disease. It may lead to restlessness, fever, indigestion, or even to convulsions, but in most cases is attended by no special symptoms; and there is danger that, from regarding it as a cause, the serious and real causes will be overlooked; hence, always investigate these diseases carefully, although the child be teething at the time.

At birth the teeth are enclosed in sacs, occupying depressions in the jaws, and, as growth progresses, they pierce the gums. These first teeth, called deciduous or milk teeth, are twenty in number and, although they may vary in the time, they rarely vary in the order of their coming. The following is an average of the order and time of their first appearance:

Number.	Name.	Months after birth.
2	Lower incisors	6 to 9
4	Upper incisors	8 to 12
2	Lower lateral incisors	12 to 15
4	First molars	12 to 15
4	Cuspids, also called canines	18 to 24
4	Second molars	24 to 30

There are many variations to this rule. The teeth may begin to appear during the third or fourth month, or may be delayed until the eleventh or twelfth month. In a weak, poorly nourished child, teething is nearly always delayed.

The teeth may appear without any noticeable disturbance, but usually there is redness and swelling of the gums and increase of the saliva. The child wants to bite something hard and may want to keep its fingers in its mouth; it may become restless and fretful, and sleep less than usual, and there may be loss of appetite. There is often constipation, and there may be diarrhea, either of which conditions should receive attention. If a child be forced to take more food than it desires, attacks of indigestion, vomiting or diarrhea may follow. In some cases there is high fever and a hot, dry condition of the mouth and gums. Earache may also accompany the teething stage, and gradually leave as the teeth appear. These symptoms usually last two or three days, then subside as the teeth make their appearance, but they may last a week, and, if severe, a physician should be consulted. In some cases that have not received proper attention convulsions may occur, for which a hot mustard bath should be given and a doctor called immediately.

Children should not be exposed during the period of dentition, for they are then very susceptible to cold, and only a little exposure may result in bronchitis or pneumonia. The gums very rarely need lancing, and when required it should be done only by one who is skillful.

Care of the teeth should begin in infancy. As soon as they first appear, the mother or nurse should cleanse them daily with a soft linen or muslin rag, and as soon as they have all appeared a small, soft brush should be used. It should early form the habit of caring for its own teeth. It must not be allowed to suck its fingers, as this habit may cause the teeth to assume an abnormal position. The constant weight of the thumb, or fingers, in the mouth may cause the lower front teeth to point in, and force the upper ones outward, thus causing an unsightly deformity of both jaws.

Decay of the teeth, whether of the temporary or permanent set, should receive prompt attention. A child two years old should have its teeth examined by a dentist and treated if necessary; after which they should be examined every six or eight

months and kept in repair until they drop out, and are replaced by the permanent set. Dentifrices, except as recommended by a reliable dentist, should not be used.

The permanent teeth begin to appear about the sixth year, number thirty-two and come about as follows:

First molars, at about	6 years of age
Incisors, at about	7 to 8 years of age
Bicuspid, at about	9 to 10 years of age
Cuspid, at about	12 to 14 years of age
Second molars, at about	12 to 15 years of age
Third molars, at about	17 to 25 years of age

CHAPTER III.

DISEASES OF THE MOUTH.

Disease of the mouth, of an inflammatory character, is called, in medical works, stomatitis. There are five forms of this disease which we will describe: (1) Catarrhal stomatitis; (2) Ulcerative stomatitis; (3) Aphthous stomatitis; (4) Noma, or gangrenous stomatitis; (5) Thrush.

CATARRHAL STOMATITIS.

This begins with reddened patches in the mouth, which is apt to spread until the entire mucous membrane of the mouth and tongue is involved. The mouth becomes swollen, hot and sore, and soon raw places appear which are painful and irritating. At first the mouth is dry, but soon the saliva flows freely and, with babies, the drooling is often excessive. The excreted fluid is acid in its reaction and so irritating that the skin around the mouth is made sore by it. If the inflammation is not soon arrested ulcers begin to appear and the ulcerative form of the disease follows.

The usual causes of the catarrhal form are lack of cleanliness, bad teeth, irritating food and the various things covered with paint or other irritating material which a baby is likely to put in its mouth.

Treatment.—Only simple remedies are needed. Borax water, one teaspoonful of borax to a pint of water, used on a swab is usually sufficient. One end of a stick, the size of a slate pencil and six or eight inches long, is wrapped with a little piece of soft linen or absorbent cotton and dipped in the solution, or better, a little of the solution is poured over it, and with this the sore mouth is gently, but thoroughly washed. This should be repeated every one to three hours. In some cases alum is better than borax. Listerine, euthymol and borolyptol are proprietary articles which, at times, are useful.

ULCERATIVE STOMATITIS.

This form usually occurs after the child has teeth, and is likely to be confined to the gums. They become red, swollen and sore and bleed very easily. The gums soften, the teeth loosen, and the child becomes irritable and sometimes feverish. The glands about the neck may become enlarged and sore, or may even suppurate. This form of the disease usually requires constitutional treatment as well as local applications.

Treatment.—A half teaspoonful of Parke, Davis & Co.'s syrup of the hypophosphites three times a day, for a child four years old, is useful. It is of the first importance that the ulcers be kept clean by frequent rinsing with one of the preparations above mentioned. At times an astringent powder, composed of one part powdered alum to three parts of powdered boric acid or bismuth, is useful.

APHTHOUS STOMATITIS.

Aphthous Stomatitis, or canker sore mouth, is characterized by from one to twenty small ulcers on the mucous membrane of the mouth. They are usually round, but sometimes oblong, and vary in size, from that of a pinhead to a pea, are of a yellowish white color, looking as if a little piece had been dug from the membrane, leaving a small hole, and are quite painful. The mouth becomes hot and tender, and the saliva is increased, acid and irritating.

This trouble is usually caused by indigestion, and by certain foods, as tomatoes and articles prepared with vinegar. It often occurs during dentition, but may come at any age.

Treatment.—Regulate the diet, particularly as to sour food, sugar and starchy articles. A plain diet, limited in amount, will usually effect a cure in a week or so. If there is constipation, a dose of Epsom salts, taken in hot water before breakfast, is advised. One-tenth grain calomel tritulates, one taken every hour for six to ten hours, and, if the bowels do not move freely, followed by salts the next morning, are very efficient. For local application, a solution of chlorate of potash, alum, sulphate of zinc, or sulphate of copper, is useful.

NOMA, OR GANGRENOUS STOMATITIS.

This is a dreadful disease but, fortunately, is very rare. As a rule it occurs only in children already weakened by measles or

some other disease, and therefore unable to resist as a healthy child would. It appears on the inside of the cheek as a sore lump about as large as a pea. This rapidly enlarges, turns black and begins to slough. The odor is extremely offensive and the discharge from the sore very irritating. All the tissues of the cheek are soon involved, and a hole made, through which the teeth can be seen. As it progresses, all the tissues of the mouth are attacked, the gums drop away, the teeth come out and at last death closes the scene, unless the progress of the disease is stopped.

No one, not specially fitted, should attempt to treat this disease. The child should be taken to a good physician as soon as the malady is recognized. With the most skillful over half of the cases prove fatal.

THRUSH.

This is a disease caused by fungus growth. It formerly was more common than it is to-day, unless the name was also given to other mouth diseases. It is found only in young, sickly babies, who are poorly nourished. As long as a child is reasonably well, nature protects the mucous membrane of its mouth from growths of this kind. It is of vegetable character, appears as a thin, white covering on the membrane of the mouth, very much as mold appears on food that has long been left in a damp, warm place, and spreads in every direction. At first, while upon the surface of the membrane, it can be brushed off, but it gradually makes the membrane sore and, if neglected, finally destroys it. It may descend into the stomach, and even into the intestines, in which case it is said to have "gone through the baby." There is a common belief that such an occurrence is surely fatal, but it is not.

Treatment.—The treatment of thrush is both local and constitutional.

Everything possible must be done for the general health of the child. Great care must be used to secure for it a good nourishing food that it can digest. Cod-liver oil should be given internally and it is a wise plan to bathe the child in it two or three times a day, rubbing until absorbed it disappears in the skin. A good tonic, as the hypophosphites, is also useful.

For local treatment, chlorate of potash has the most indorsers. A solution, in the proportion of one teaspoonful of it to a pint of water, is used every hour or two to wash the mouth. Boro-gly-

cerite is also good for this purpose. Some mild antiseptic solution should be used gently and often.

DISEASES OF THE STOMACH.

The diseases of the stomach and intestines of children are very closely allied, and we cannot make their diagnosis as clearly and closely as to exact location and condition, as we can in adults. Fortunately, this is not usually necessary, as the treatment for either condition is similar to that for the other. Many babies lose their lives from stomach and intestinal diseases, and this, too, although it is possible for the mother to treat her child successfully by doing the right thing at the very beginning of the symptoms. Of course, it is not safe for her to trust her own skill too far, lest the disease finally get such headway as to baffle even the most skillful physician. The instructions I shall give are for emergency cases, where it is impossible to get a physician, or where the symptoms are mild. If, however, relief is not at once obtained, it is better to consult a physician, when one can be obtained.

ACUTE DYSPEPSIA. GASTRALGIA. GASTRIC FEVER.

This is an acute affection of the stomach, which is quite common among babies during the summer months. It is usually caused by improper feeding, combined with teething, hot weather and fretfulness. It comes on with vomiting, which is soon followed by fever. As a rule the baby is in distress and pain for a few minutes to an hour or more before it vomits, and the pain often continues an hour, or longer, afterward. The pulse is quick and usually the abdomen is full. It is not a severe affection and is likely to last but a few hours to a few days, unless it is neglected and the intestines become affected.

Treatment.—The treatment consists in regulating the baby's food, and getting rid of the irritating matter in the stomach. For a child over one year of age, scalded milk, barley water and milk, white of an egg in boiled water, or boiling milk poured over a cracker, then covered and allowed to steam for five or ten minutes, are proper foods. They should be given in small quantities and not too often, and not at all if they excite vomiting. A mother is sometimes distressed because her baby "has not eaten a thing," or, "has thrown up everything it has eaten all day."

She seems to be afraid it will starve; but a moment's thought should quiet her fears. We have authentic records of persons living forty days without food, and many have gone a week without taking nourishment, and that, too, when they were already weak from sickness. If, then, it is possible to go from one to six or seven weeks without food, we may feel perfectly at ease when the baby goes without food from twelve to forty-eight hours. Indeed, one of the best treatments possible in stomach and bowel diseases of children is to have them go a day or two without food. In regard to remedies, there are no specifics, that is, no medicines that will always cure, or that it is always best to give. If the child vomits freely and is relieved, no further treatment is necessary, but if it continues to strain and throw up sour or bad smelling matter, it is well to give it warm water, containing a little soda and peppermint. To a half teaspoonful of soda, a teaspoonful of sugar, and from three to ten drops of essence of peppermint add a teacupful of warm water, and have the child take all it can. This usually empties the stomach and quiets it afterward. If the child vomits with great difficulty it is well to give a cathartic instead, such as a one-tenth grain calomel triturate every hour until ten have been taken, or one teaspoonful of Epsom salts in a half cup of warm, sweetened water, flavored with peppermint or wintergreen.

VOMITING.

Vomiting is of such frequent occurrence with children as to deserve a few words. It may be discussed under two forms: (1) Harmless, and (2) Dangerous. Harmless vomiting is that which occurs in healthy babies soon after eating, where they throw up only a little food, and that not very often. Dangerous vomiting is that form which makes the child ill, and occurs at any time after feeding, the child throwing up all its food and continuing to do so for some time.

The first form is so well recognized as harmless that there is a saying that "a baby that throws up after nursing is a healthy one." It is very easy for a baby to vomit and, if the stomach is overloaded, that usually makes it vomit, so when it gets too much milk and throws part of it up, the baby is more apt to be healthy than if the stomach retained it and could not digest it; but if a child digests its food it is better for it not to vomit. It

is also better to give the child only such a quantity as it can digest, than to give it too much and let it vomit the excess.

If the baby vomits persistently, loses flesh and appears sick, it is in a dangerous condition, and must be treated. At such a time the flesh usually becomes flabby, the skin has a scurvy appearance, often the stomach is distended, the face is "pinched," and, unless the process can be arrested, the child eventually starves to death.

Treatment.—The treatment is very largely one of feeding, although medicinal remedies are often helpful in arresting vomiting, and, at times, digestants are temporarily useful. To stop the vomiting and to help digest the food, Ingluvin has proven valuable; one grain for a baby one year old, repeated every one to three hours. Very small doses of calomel are helpful; one-twentieth of a grain every half hour for six or eight doses, then once every four hours, will relieve. Equal parts of lime water and cinnamonwater have many advocates. To a child two years old it should be given in teaspoonful doses. Small doses of Fowler's solution of arsenic not only control the vomiting, but are a good tonic, as well; one drop doses repeated every four hours for a child one year old.

In regard to foods at this time, see the article on Infant Feeding.

Vomiting may be a symptom of a coming disease:

1. When the pulse is quick, the stomach full, accompanied, perhaps, by either diarrhea or constipation, it indicates indigestion.
2. If the vomiting comes on suddenly, and is followed in an hour or so by fever, and the throat is red and sore, scarlet fever is indicated.
3. If the vomiting is free without much straining or effort, and the pulse is very slow, and at times irregular, and the abdomen is retracted, and there is constipation, it is an indication of brain disease.
4. Vomiting attended by severe pain and retching, followed by a collapsed condition, is an indication of intussusception, which means that a portion of the intestine has slipped into another portion of itself, stopping it up, just as part of a glove finger can be slipped into another part.

EVACUATIONS FROM THE BOWELS.

Before taking up the intestinal diseases, we desire to say a few things as to the passages being indicative of certain diseases and conditions. A healthy baby, less than a year old, nursing or being fed upon milk only, should have from one to four evacuations in twenty-four hours, usually about four for the first two months; three for the next two months; two per day between the ages of four and ten months; and after that one per day. There are many exceptions to this rule, even in healthy children, but every infant should have at least one evacuation each day.

The feces of a healthy infant vary in color from a pale yellow to an orange yellow; they are smooth and about the consistency of cream; sometimes being quite fluid, while at other times are almost stiff enough to keep form. Any decided variation from this, either in color or consistency, is an indication of some diseased condition.

When little white lumps (curdled milk) appear, scattered through the feces, and the latter are somewhat formed and are lumpy and of a yellowish or brownish color, they indicate an approaching attack of indigestion.

In catarrhal inflammation of the bowels the movements become frequent, and the feces have a green color, are partly watery, and partly formed and lumpy. Mucus resembling the white of an egg is mixed through the feces, a result of the inflammation in the mucous membrane.

It has long been a subject of investigation and discussion as to the cause of this green color. Some believe it is caused by the bile, some, that it is of bacterial origin, and others, that it is a chemical change and of no pathological importance. The fact that, sometimes, the color does not show much until after the passage points toward a chemical origin, but, whatever the cause, the green is indicative of catarrhal inflammation.

If the discharges are very watery and contain much mucus, they indicate that a large surface is affected. The green color and slimy appearance are supposed by many to indicate a cold. This has arisen from the fact that a cold will often produce the disease, but, as other causes will also do this, it is better to regard the trouble as catarrhal inflammation.

When blood appears in the stools, it indicates that the inflammation has destroyed the mucous membrane and opened one or more small blood vessels.

There are several medicines, often given to babies, which change the color of the stools so decidedly as to alarm the mother, unless she knows the cause. The two remedies most likely to do this are iron and bismuth. They cause black, or greenish black stools which, as a rule, can easily be distinguished from the green of catarrhal inflammation.

Blood appears more frequently in the feces of infants than in those of adults, but is not as dangerous, usually, as one would naturally expect. It may appear as a bright red, which anyone would at once recognize as blood, or it may be black and in little lumps, not appearing to be blood unless closely examined; and it may even require a microscope to decide that it is blood. If the blood is of a bright red, and covers or streaks the feces, rather than mixing intimately with them, it indicates that there is a diseased condition near the anus, in the rectum, or lower end of the large intestine. If the blood is black and has a coffee-grounds appearance, the disease is probably in the small intestine, or even in the stomach. A physician should be consulted if the blood persists, but if it appears only once or twice no treatment is necessary.

At times the feces have a very foul odor, as of decaying matter. This is produced by the contents of the intestines fermenting or decaying, and poisonous compounds are often thus produced that cause very serious diarrheal troubles, including cholera infantum. One of the best ways of treating this condition is to give a one-tenth of a grain calomel triturate every half hour until from eight to twelve have been taken, then give sufficient salts (Epsom, Glauber's or Rochelle) to produce a free movement of the bowels, thus washing out the decaying matter. The baby should be given no food at all for from twelve to twenty-four hours.

COLIC.

Colic is so frequent with children, less than three months of age, that a separate description seems desirable. It is a painful disease of early infancy, the pain being produced by gas collecting in the intestines or stomach. It is usually caused by foods difficult of digestion, and is often attended by fermentative changes in the food. As a rule, the attack comes on soon after the baby has taken its food, but it may come at any time and may last from a few minutes to hours. The child frets, groans and twists for a little while, then opens its mouth and yells, as if in the greatest agony. The

abdomen is distended and firm; the hands clinched; the legs drawn up and the whole body very rigid; not continuously so, however, for at times the baby kicks and squirms. Often the attack terminates by the belching up of a little gas from the stomach or the escape of wind from the bowels, after which the baby seems perfectly well and smiles and coos as if nothing at all had happened. So often is this the case that parents are led to believe that the baby is only cross and ugly, and cries merely to secure attention and be held or carried. Children undoubtedly do this sometimes, but their cries are then different—more coaxing and less continuous, and not attended with such a rigid condition of the body.

Treatment.—The treatment of colic is by no means an easy or simple matter, although everybody has something to recommend as a sure cure. Of course, the first indication for treatment is the pain, but we must remember that relieving the pain is not curing the colic, for it will surely return unless the cause is removed. This most frequently is indigestion. The proper treatment, therefore, will not stop when the pain is relieved. We should find just what form of indigestion is troubling the child and treat it accordingly. See article on Infant Feeding.

If a food is given which agrees with the baby, the colic usually disappears. At times some digestive preparation is useful, such as peptonzyme, elixir lactopeptin, etc. The thing the parents most want and the baby first needs, however, is something to stop the pain. A multitude of drugs have been used for this purpose, but not one of them is uniformly successful. A remedy that acts like a charm at one time, at another fails entirely, or works beautifully with one child and not at all with another. It is necessary, therefore, to try different remedies. The carminatives or pain soothing medicines are the ones generally used. If peppermint or catnip can be obtained, it should be tried first. Make a tea of the green leaves, sweeten with a little sugar, and give it warm in teaspoonful doses every twenty minutes until the child is relieved. The oils of anise, cinnamon, cloves, peppermint, fennel and valerian are all useful. They should be greatly diluted, sweetened and given in the same way as the tea above mentioned.

Asafetida, chloroform, whisky and opium, in some form, are sometimes used, but all except the first are such dangerous poisons they should not be given to a baby unless ordered by a

physician. In severe cases either of the following prescriptions may be used:

Sweet spirits of ether.....one dram
 Sulphate of magnesia.....one dram
 Oil of cajuput one drop
 Syrup of tolu.....one-half ounce
 Liquor carbonate of magnesia enough to make two ounces.
 Dose, one-half teaspoonful two to four times a day.

Deodorized tincture of opium.....twenty drops
 Oil of anise, cloves and wintergreen...three drops each
 Tincture of asafetida.....one dram
 Carbonate of magnesiaone dram
 Peppermint water enough to make four ounces.

Dose, ten to twenty drops, repeated in half an hour, if necessary.

CONSTIPATION.

This is a very prevalent ailment among people of all ages, but less common in infants than in adults, yet it is very prevalent among babies that are brought up on artificial food. Much can be done to correct the condition in adults by using suitable foods, but with the baby our bill of fare is limited, and other means must be employed. Constipation may exist, even though the bowels move once each day, and it often alternates with diarrhea. We may define constipation as that condition of the bowels which causes infrequent, irregular or abnormally hard stools. Of course, if the bowels are loose we call the condition diarrhea, but if the usual condition is a hard, infrequent stool, it may be that the constipation has caused the diarrhea, in which case it is constipation, not diarrhea, that needs treatment.

Constipation may be caused by malformation of the rectum or anus, and whenever it exists from birth these parts of the body should be examined by a competent physician. The anus may be too tight and have to be stretched—a condition producing severe pain whenever the bowels move, even though the feces be comparatively soft. Pain is also produced when there is a fissure or tear of the anus.

In treating a baby for constipation, we should have a large knowledge of means, as no one treatment is always effective. We therefore mention a number of plans, one or more of which may

be tried at one time. Rubbing the bowels in a circular direction from right to left, with or without some oily preparation, is sometimes effective. If the baby is thin, pure cod-liver oil is best, but if it is plump and healthy, lard, sweet oil or cocoa butter are suitable. A soap pencil, from two to three inches long and from one-fourth to one-third of an inch thick, dipped in warm water or glycerin and inserted into the rectum and held there until the child begins to strain, is often effective. Wyeth Brothers of Philadelphia put up glycerin suppositories, similar in shape to the soap pencil and used in the same way, that are often better. Another plan is to mix one part of glycerin and three parts of water and inject from two to four teaspoonfuls into the rectum; done most conveniently by using a small rubber syringe that will hold just the required amount. Warm water or soapy water injections are sometimes employed, but we doubt their value for everyday use, our observation being that they create necessity for their continuance instead of aiding in the cure of the constipation. Their occasional use, however, is proper. These means of securing passages are harmless and should be tried before resorting to medicines, and sometimes continued while medicine is being used.

In the way of drugs we have obtained the best results from either cascara aromatic, fifteen drops; sodium phosphate, three to five grains; syrup of senna, half a teaspoonful, or a pill, composed of aloin, belladonna and strychnia, on sale at the drugstores. The above doses are for a baby one year old, and any one of them should be given at bedtime.

After the baby is a year old we may aid in the correction of this difficulty by giving it certain foods. Oatmeal water, made by boiling a heaping tablespoonful of oat flakes or meal in a quart of water for two or more hours, adding water from time to time that there may be a quart at the end, should be strained and added to the baby's milk, equal parts of each. Scraped apples are useful; so is grape juice, or prune juice, or other fruit juices. The pulp and seeds should not be used.

INTESTINAL DISEASES.

In medical works these diseases are described under a good many different names. To attempt an exhaustive description of them here would be to confuse rather than to help. I shall there-

fore simplify by putting what I have to say under three heads: (1) Diarrheas. (2) Catarrhal inflammation of the intestines. (3) Cholera infantum.

DIARRHEA.

Diarrhea may be defined as being too frequent and too liquid discharges from the bowels. This condition may exist in a child for some time without producing any serious symptoms; indeed, I have seen infants who have not been free from it five days in succession for three or four months, yet have not been in bed a single day because of it. These, however, are exceptional cases. The rule is that whenever the discharges grow thin, watery and frequent, the child becomes weak, enaciated and sick.

There is a distinct tendency toward a chronic condition in this disease, and it is very likely to take on severer forms unless promptly checked. With this form there is little or no fever, very little pain, and not very much weakness, the diarrhea being the most prominent symptom. The causes are hot weather, filth, putrefaction, sudden barometric changes, overfeeding, improper feeding, teething and overexertion or excitement.

Treatment.—The treatment is usually simple and quickly effective if used early in the attack. There are two things to do. First: Empty the bowels of all irritating material. Second: Give some antiseptic and soothing medicine, which will stop fermentation and allay irritation.

Perhaps the best and quickest way to accomplish the former object is to give an even teaspoonful of Epsom or Glauber's salts in one-third of a glass of sweetened water, to a baby from one to two years old, and repeat every hour until the bowels move freely. If the child objects too vigorously to the salts, give, instead, a one-tenth grain calomel triturate every half-hour until a free movement is secured. Castor oil, rhubarb or senna may be used if preferred. During the administration of the cathartic, and for several hours after its action, it is advisable to give no food at all, but the child should be allowed all the cool water it wishes, unless it causes vomiting.

For the second part of the treatment bismuth, either the subcarbonate or subnitrate, stands at the head of the list, as a mild, soothing antiseptic for the bowels, and is usually sufficient. Sulphocarbolate of zinc or of soda are more recent drugs, and are

efficient, and euthymol, listerine or other similar preparations are sometimes useful. For a week after an attack of diarrhea the diet of the child should be carefully regulated as to time of feeding and quantity and kinds of food. Sterilized milk is one of the best foods. Stale or toasted bread may be given babies over a year and a half old. Barley water and milk, white of eggs in water, beef juice, custard and blanché mange are all appropriate foods. Avoid fruits, vegetables, and too much sweet or starchy food.

CATARRHAL INFLAMMATION OF THE INTESTINES.

Under this name we will describe those inflammatory conditions of the intestines which occur so frequently during hot weather, in infants from one to three years of age, and which are called by many different names, as Summer Complaint, Gastro-intestinal Infection, Entero-collitis, etc.

This disease occurs most frequently in the most thickly inhabited portions of large cities, and amid filthy surroundings. It is most apt to attack children during their second summer, but may come at any time until the child has reached three or four years.

The mucous lining of the intestines is the part involved, and the fact that it may be in any part of the intestinal tract and of any degree of intensity, and is produced by a variety of causes, have led to the varied classification. Sometimes it is severe enough to produce death, yet a postmortem examination may show very slight inflammation. At other times the inflammation may be so intense as to eat clear through the intestines. At first the inflammation causes the cells of the mucous membrane to become swollen, then softened, then destroyed, so that pieces of the membrane sometimes slough off and are found in the stools. These pieces may be in shreds, and be mistaken for worms, or the whole inside coat of a portion of the intestine may come away and look just as if a section of the entire intestine had come. Sometimes the symptoms are very severe, with much fever, brain disturbance and prostration, at other times the child does not have to go to bed; but, whatever the cause, and however much the manifestations may vary in intensity, the disease is an inflamed condition of the intestine.

Perhaps the most striking cause is hot weather, high av-

erage heat for twenty-four hours. A high temperature for a few hours, or a hot day followed by a cool night, does not seem to be as bad as continuous heat. It has been shown by statistics that by far the greatest average mortality from this disease occurs during the second and third weeks of July, and always during the period of greatest heat. It has often been regarded as a germ disease, but, while many kinds of bacilli are found in the feces, no one variety has been shown to be always present or to produce the same disease in animals. That the disease chiefly occurs under conditions most favorable to the growth of germs, and, in certain forms, is quite similar in its course to other germ diseases, points strongly to a germ origin, but as yet we cannot demonstrate it.

A second cause is found in the age of the child, it being most common at two years or a little less; probably because the membranes at this age are very tender and easily disturbed, and because digestion is not yet thoroughly established.

A third cause is improper feeding. Most children having this disease are bottle-fed babies, and very frequently some improper food can be shown to have caused the attack. During hot weather only a little food is needed, and that should be of a kind that is easily and quickly digested. The article on Infant Feeding shows the proper kinds of food and how they should be given. Diarrhea and previous indigestion very often lead to this severer disease, for which reason no case of diarrhea or indigestion should be neglected. At times the passages, by their odor and by being full of little bubbles, show plainly that there is fermentation going on—a frequent cause of the disease. Bacteria are particularly numerous in these cases, and doubtless play an important part in their causation.

Although the symptoms of the disease vary considerably in intensity and kind, diarrhea is always present, and usually there is vomiting, fever and pain. A somewhat typical case is seen in a usually healthy baby that becomes cross and restless; it does not sleep as well as usual, wakes suddenly in the middle of its day nap and begins to cry and twist; refuses food, or perhaps takes some food and in a few minutes throws it up. This is usually sour. We next notice that there is fever and the pulse is very fast; the palms of the hands and soles of the feet are hot and dry. In a time, varying from a few hours to twenty-four, the bowels

move, and the passages are watery and smell either sour or foul. The abdomen is swollen and tense, and when tapped upon sounds drum-like, thus indicating that the intestines are full of gas. Usually, too, there is much rumbling.

If the case grows worse, the passages become quite frequent (six to twenty in a day) and small in quantity; the child quickly becomes emaciated; the eyes, sunken; the muscles, flabby. If death results, the end usually comes in one of two ways:

First. The child becomes drowsy, seems exhausted, is hard to rouse; the hands and feet grow cold; the nose is cold; the breathing becomes slow, with a quick inspiration and a slow expiration, and the child passes away quietly.

Second. The child becomes very fretful, vomits often, cries out with a piercing scream; the skin becomes very hot and dry; the head rolls from side to side; the eyes become crossed; convulsions come, and death relieves the little sufferer.

While most of the babies thus attacked recover, many die, hence this should always be regarded as a serious disease, and the child should be attended to at once, even though at first it does not seem very ill. The younger the baby, the more sudden the attack, the higher the fever, and the more numerous the symptoms of the graver disease. Relapses are very apt to occur, and where a baby is attacked early in the summer it will require careful attention until fall, although it may not be sick all the time.

The disease may prove fatal in a few days, or it may continue for months, and even then end in recovery. No case should be given up to die. We must work as long as life lasts, for a child sometimes recovers when it seems as if it must die.

Treatment.—Before describing the medical treatment, it is desirable to speak of the general care of the baby, for its recovery depends upon that quite as much as upon the medicine it gets. If the mother is a competent nurse she should devote herself to the child and have as little other care as possible. If she is not a skillful nurse (many most excellent mothers are not) she should get someone who is able to care for it. A trained nurse is the best help, but if one cannot be obtained, an efficient woman can usually be found.

Remembering that heat is a cause of the disease, we should do all we can to keep the little sufferer cool. When it can be

afforded, the baby should be taken to the seashore or mountains; but, unfortunately, this cannot often be done, and many times we have to do the best we can with very limited means. Sometimes it can be taken into the country for a few days. In some cities the public park offers a place that is cooler than the home. If no such resort is accessible, the coolest room in the home should be selected and made as comfortable as possible. Wet towels, hung in front of the windows where the draught will cause rapid evaporation, will help. Sometimes a large shade tree in the yard offers a cool place, and at times the gentle swing of a hammock is a real comfort. In many homes electric fans can be used to advantage. We can mention here only a few ways, but hope that these may lead parents and friends to devise others.

When there is fever, the bath is often the best means of relief. The baby can be put in a tub of warm (99 degrees) water, then cool water be added until the temperature is about 75 degrees or 80 degrees. If the child does not enjoy this, it can be sponged with cool (85 degrees to 90 degrees) water, or a cloth wrung out of cold (60 degrees) water can be placed over the forehead and crown of the head, and frequently changed. The clothing should be very light and simple. A flannel or silk band, a dress of thin flannel or woollen goods, and diapers of some soft material, are usually enough.

The baby generally craves cold water, and should get it often. Let the water be boiled for thirty minutes and aerated, and one or two tablespoonfuls given at a time. The water replaces that drained from the tissues by the diarrhea, and helps to control the fever. Sometimes the stomach is so irritable that even water cannot be retained; in which case the white of an egg may be mixed with a pint of boiled water, and a teaspoonful given every five or ten minutes. If this is not retained, wait from one to four hours, then try again. If it still vomits, an injection of salt water, a teaspoonful to the quart, should be used, and the buttocks held together to retain it as long as possible.

The food of the baby is very important, and the article on Infant Feeding should be consulted. If the milk comes through curdled and foul-smelling, and the baby is cross and feverish, the milk should be withheld from twenty-four to forty-eight hours, and beet juice, Bovenine, white of eggs or Panopepton given in its place. If they do not agree grape juice or blackberry juice

may be tried. At times it is well to give nothing; the tendency in hot weather is to overfeed. The baby often cries as if hungry, when only thirsty. When we return to the milk, we should give it in a diluted form and very gradually restore the normal amount of food.

Medical treatment has four things to do: (1) Clear the bowels of irritating matter. (2) Stop decomposition. (3) Restore the normal action of the bowels. (4) Heal the inflamed mucous membrane.

(1.) A brisk, quick cathartic is the best means of washing out the bowels. Epsom, Glauber's or Rochelle salts are excellent, because of their speedy action and the watery passages they produce. They are particularly indicated early in the attack. If the diarrhea has lasted a day or more, one-tenth grain calomel triturates are better, and should be given every half-hour until six or eight are taken by a child one year old. If they do not produce free action of the bowels, salts should be given after the calomel has been taken. Castor oil is efficient; aromatic syrup of rhubarb is also good.

(2.) We stop decomposition by the means of antiseptic medicines. There have been so many kinds tried that we will not attempt to name them, but will mention a few that have been well proven: Subnitrate of bismuth stands at the head, and should be given in one to five grain doses to a child one year old. Sulphocarbolate of zinc or of sodium is now largely used, either alone or combined. I use the sodium when there is much fermentation, but the zinc when the passages incline to be serous in character. The dose for a year-old baby is one-half to one grain of the zinc salt, or one to three grains of the sodium. Arsenite of copper in very small doses (one five-hundredth of a grain) is quite useful where the nervous symptoms prevail. Borolyptol, listerine and euthymol are useful; subgallate of bismuth, salol and resorcin are also employed.

(3.) Diarrheal diseases weaken a child very rapidly, and are likely to leave the digestive organs in a weakened condition, hence the food should be very carefully regulated for at least a week after an attack, and it is usually desirable to give a tonic and digestive preparation for a while to restore the normal condition. As a tonic, some preparation of iron, strychnia or arsenic is desirable, either in combination or separately. Hypophosphites are

good; arsenite of iron or strychnia is also useful. Pepsin and pancreatin, in any of the many good preparations, are to be used when the food is not digested. Peptonzyme is largely used, also lactopeptine.

(4.) When the disease has been severe or long continued, ulcers or patches denuded of mucous membrane are sometimes produced and require attention. A "whitewash" composed of thin starch water and bismuth subnitrate, is very useful, employed as an injection. Of course, injections can reach only places in the large intestine; for those in the small intestine medicines through the mouth must be used, subnitrate of bismuth being one of the best. The buttocks of the baby sometimes become inflamed from irritating discharges, for which oxide of zinc ointment, benzoated, is one of the best applications, except in a few cases, when a dry preparation is better. Powdered boric acid or bismuth subgallate are excellent, either alone or mixed with an equal quantity of corn starch or powdered talc.

CHOLERA INFANTUM.

Cholera infantum is one of the most fatal, and, therefore, one of the most dreaded of children's diseases. It comes during the hot months of summer, particularly when the mean temperature for the twenty-four hours is above 70 degrees, and is caused by a poison which is developed in milk, and probably is the ptomain, tyrotoxicon, discovered by Dr. Vaughn of Ann Arbor. His experiments show that it is especially likely to appear in milk that is put into cans while warm, then closed and allowed to stand in a warm place. It has been found in cheese, as well as in milk, though infrequently. When this tyrotoxicon is given to animals they have symptoms very much like the child that has cholera infantum.

Symptoms.—Attacks of cholera infantum always come suddenly and with great severity, even when preceded by a diarrheal difficulty. A healthy child, suddenly and without any warning, may come down with cholera infantum, or in an unhealthy one, who has but recently recovered from a diarrhea, or is still suffering with it, an attack of cholera infantum may suddenly develop, either in addition to, or taking the place of the other disease. Purging suddenly begins, and the feces become watery and of a musty odor, and although at times at the beginning of the attack the odor may be very foul, its characteristic smell is musty.

Along with the purging comes severe vomiting, the vomiting usually accompanying each movement of the bowels. The stools at first are copious, but as the disease progresses and the child grows weaker they become less in quantity. The frequency of the bowel movements is so great as to be very indicative of the disease; they sometimes reach as many as thirty or forty in twenty-four hours, and for a while may occur every few minutes. The vomiting is severe and nausea is almost continuous. If at the beginning of the attack there is food or mucus in the stomach it is first vomited, then a serous watery material is thrown out, after which there may be retching and vigorous attempts at vomiting without results. Food and water only increase the vomiting and nausea, and although thirst is intense all through the disease we cannot give the baby drink because that increases the vomiting.

So much serous matter is vomited and thrown off by the bowels as to produce great prostration, and emaciation progresses at a fearful rate. A baby, fat and healthy one day, may become so emaciated the next that its skin becomes wrinkled and its muscles flabby. The most frequent cause of death is exhaustion, due to this terrible waste. At first the child is irritable and throws itself about, but gradually goes into a comatose condition from which it rarely recovers.

The nervous symptoms are usually marked and convulsions are not infrequent. The eyes become sunken and have the vacant stare so characteristic of brain disease. Often the baby rolls its head from side to side with a jerky, uncertain movement, and interrupts its fretful, peevish cry with a piercing scream.

The temperature is almost always high, ranging from 103 degrees to 107 degrees per rectum, but at the same time the face, hands and feet, and sometimes even the body, may feel cool. This means that the surface temperature may be sub-normal (below 98.6 degrees), while the rectal temperature is 103 degrees or more.

Such are the symptoms of this dread disease, and while they may not all exist in a typical form in every case, there are usually enough of them to make the diagnosis easy and positive.

Treatment.—First and best of all is preventive treatment. It may be set down as a fact that the baby will not have cholera infantum unless it be given infected milk. Some physicians believe that it has been taken from milk left on the mother's nipple after nursing, which, having become infected, evaporates, leaving its

infectious poison to be taken into the mouth of the child at the next nursing. It is also believed that a child, by sucking its own fingers, may get this poison, developed by milk, with which they have been wet, becoming infected. Such a thing is certainly possible, but, in our opinion, exceedingly rare.

The most frequent source of infection is found in milk improperly cared for in some stage of its transition from the cow to the baby, hence, the importance of intelligent preventive treatment. Milk, as it comes from the cow, is practically sterile, and if we can keep it so until the baby gets it there will be no cholera infantum, and very much less summer complaint.

The important factors in keeping milk sterile are these: (1) Make the time from cow to baby as short as possible. (2) Cool the milk quickly and keep it cool, unless it can be fed immediately after the milking. (3) Thoroughly boil all vessels used for the milk. (4) Keep the milk in a clean place, as well while at the stable as while in the ice chest. (5) Sterilize the milk in all cases of doubt, by keeping it for thirty minutes at about 165 degrees Fahrenheit.

Treatment of the Attack.—The first thing is to get rid of the poison. As it comes from milk, we should give the child no milk during the attack, and in some cases it should be withheld for a month afterward. Beef juice, albumen water and broths are the best substitutes. If the disease is detected early in the attack, an active cathartic should be given, consisting of six or eight one-tenth of a grain calomel triturates given a half hour apart to a child a year old, or a teaspoonful of castor oil, either of which is to be followed two hours later by a teaspoonful of Epsom or Glauber's salts, the latter being preferable.

If the bowels have been moving very frequently and the dejections had the musty smell and serous character, the cathartic should not be given, but the bowels should be washed out with an antiseptic injection, such as two teaspoonfuls of borolyptol or euthymol or bismuth in a pint of sterilized water, and this should be done every two to four hours.

For the exhaustion stimulants are necessary and small doses of brandy, repeated every thirty minutes to an hour, are recommended by many authors, but my temperance convictions lead me to substitute in its stead, strychnia—one two-hundredth of a grain of strychnia sulphate, given a baby one year old, every half

hour, being of greatest value. The hot pack or bath, with or without mustard, is helpful in bringing the blood to the surface and thereby lessening the internal congestion. Digitalis is also used, and at times a hypodermic injection of morphia and atropia is useful in controlling the vomiting, and copper arsenites and carbolic acid are used sometimes with benefit, but the frequent irrigation of the rectum with some antiseptic wash, as recommended above, is perhaps the best treatment. The child needs careful watching as to food and exercise for weeks after the acute attack, and milk should not again be given it until it has regained its strength, or at least until its digestion has become good.

CHAPTER IV.

SCARLET FEVER.

Scarlet fever is a germ disease and a very contagious one. Not only will the patient give it from the time of its first appearance until the scaling period is past and he has been washed in a disinfectant, but all articles handled by him, such as furniture, books and toys, are likely to become mediums of contagion. It has often been carried by letters hundreds of miles. Infected clothing is a frequent means of spreading the disease and retains the virus a very long time. Hildebrand contracted scarlet fever from a cloak that had been put away after exposure, eighteen months before, and a case is reported in which the source of contagion was traced to an infected picture book that had been packed away in a trunk for twenty-six years.

It may be taken at any time, but is most frequent in children from eighteen months to six years of age. The older a person grows the less likely is he to contract this disease, or to suffer seriously in case he does take it. Children with fresh wounds and women just after delivery are especially liable to scarlet fever. When patients have fully recovered the cases of recurrence are rare.

The onset is sudden and occurs from two to eight days after exposure.

The first symptoms are chilliness, fever, sore throat, lassitude, headache, coated tongue, nausea, vomiting, delirium and in small children sometimes convulsions. Sore throat is usually, if not always, present and often is the first symptom noticed in adults. The rash appears the second day and consists of bright scarlet red dots or points, in countless numbers, at first separate and distinct, but soon running together and covering the entire surface, except the nose and lips, which, from contrast with the rest of the face, present a strangely pallid appearance. It is first seen upon the sides of the neck, then upon the chest and abdomen and later upon the extremities and face, attains its maximum in two or three days

and remains stationary from twenty-four to thirty-six hours, then gradually subsides. The color disappears under slight pressure. When the finger-nail is drawn over the surface a white streak appears, which soon resumes the same hue as before.

There is usually very high fever, the temperature often reaching 105 degrees the first day, going a little higher the next, then remaining high every day until the eruption fades away, when the fever also begins to subside. The scaling or peeling begins from three to five days later and generally continues from four to five weeks, not often less than two or more than eight weeks, during which period the fever all disappears and the tonsils resume their normal size.

Sore throat is at times the most serious feature of the disease and should always receive careful attention. The mucous membrane of the soft palate, uvula and pillars of the fauces are reddened and swollen, the redness often extending forward over the inner surface of the mouth. The tonsils may also be swollen and their follicles distended by a reddish white exudate, which sometimes passes over the surface, forming a false membrane. In moderately severe cases there may be ulceration and even slight gangrene, while in others an abscess may form in the tonsil itself.

Measles may be distinguished from scarlet fever by the milder character of the symptoms in the former disease and the longer time between the exposure and their first appearance. In measles there are more catarrhal symptoms and likely to be more cough, but not as high temperature, and the rash is papular in character, while that of scarlet fever is punctate. The membrane which appears on the throat in scarlet fever is distinct in character from that of other diseases, and less amenable to treatment than that of diphtheria, which may either accompany or follow scarlet fever, for not one of the contagious diseases is any protection against the others or renders the patient at all immune, but rather increases his liability to contract them if exposed either during his illness or while convalescent.

Treatment.—The patient should be kept in a large, well ventilated room, with a south exposure, in the upper story of the house. One of the windows should be constantly open at the top and bottom, and if the weather permits an open fire should be kept burning. The temperature should remain as near 70 degrees as possible and the room should be very clean. From it should be



FIG. 1. Measles.



FIG. 2. Scarlet Fever.

moved all carpets, curtains, upholstered furniture and porous materials, and a sheet saturated in a disinfectant should be hung over the outside of the door. Only those really needed to care for the patient should enter it. The bed linen should be changed often, and cleanliness, both of person and surroundings, carefully maintained. All the sputa and dejections should be immediately and thoroughly disinfected. (See Department on Disinfectants.)

The first thing to be done, when the patient is taken ill, is to give him a bath at about 88 degrees, lasting fifteen or twenty minutes, during which soap should be freely used over the entire body, and the skin well cleaned. If there is high fever, sponge the body with tepid water every ten or fifteen minutes, continuing until the temperature is reduced from one to two degrees; or give from one to two and a half grains of phenacetin every four hours to secure reduction of temperature and moisture of skin, and to quiet the patient. Tincture of aconite root, from one-sixth to one-half drop, may be used instead. If profuse sweating follows, reduce the dose or discontinue it. A warm bath should be given each day, after which anoint the skin with carbolized vaseline containing two per cent of tartaric acid.

Where there are bad throat symptoms, spray the throat with peroxide of hydrogen and follow with the almond oil mixture, as per directions in the treatment of diphtheria. Hot water may be used as a gargle; a listerine solution, one part of listerine to seven of water, may also be used in the same way, and a half teaspoonful swallowed once an hour to disinfect the throat. Abscesses of the tonsil should be lanced. Indeed, this should be the prompt treatment of an abscess appearing anywhere during this disease, as delay often results very seriously.

If catarrhal symptoms appear in the nose, a pint of warm water, containing as many boric acid crystals as the water will dissolve, while cool, should be run into one nostril and allowed to pass out through the other. In doing this use a fountain syringe and very mild pressure, elevating the bag only just enough to allow the water to run through easily and thus avoiding the danger to the ears, which arises with much pressure, having first cautioned the patient against trying to swallow.

Obstinate vomiting at the beginning indicates a grave form of the disease, and is best controlled by hydrate of chloral, five to ten grains in an ounce of water. If the stomach refuses to

retain it, give the same amount by injection every three hours until the symptom is controlled.

For convulsions give one grain of hydrate of chloral every hour. If there is scant urine, give from one to five grains of bromide of potassium every four hours to act upon the kidneys. Sponging with warm water is of great value in cases of continuous high fever. Warm water applied to the head is often excellent, both to relieve delirium and to induce sleep.

The ears should be closely watched, and in case of a disorder there, they should be washed out with water as warm as can be borne, after which, if there be any discharge, they should be filled with powdered boric acid. Should the discharge become chronic, it is best treated with dilute sulphuric acid and quinine. The same is true of chronic discharges from the nose.

In case of very scant urine, the food should consist entirely of milk, but, if the stomach will not tolerate it, soft poached eggs may be eaten. This to guard against the development of Bright's disease. (See Nephritis.)

Only in cases of exhaustion should stimulants be given. Strong coffee is one of the most highly recommended for such occasions, but brandy may be used instead.

It should be more generally understood that scarletina and scarlet fever are one and the same thing, and that, however mild the attack, the patient is liable to all the sequelæ of the disease and that the contagion he imparts may, in the next case, assume the most virulent form.

The patient should remain in bed three weeks, and should stay in his room three more; even then he will not have passed all danger from the ills that follow scarlet fever. He should abstain from meat and live chiefly upon milk for a month after recovery, as a precaution against kidney disease, and not until he has had three or four warm baths in which carbolic soap, or some other good antiseptic soap, is freely used, and has been dressed in clothing free from infection, should he be permitted to resume his place with the rest of the family. All bedding and clothing that have been used about him should be boiled thirty minutes, and his room must be most thoroughly disinfected.

MEASLES.

Measles is an acute, infectious disease characterized by a papular eruption. It is due to a germ, and mostly occurs in epidemics. It may come on so slowly as to make it impossible to determine the first day of attack, but is likely to come suddenly.

Symptoms.—Usually in nine or ten days after exposure, catarrhal symptoms begin, a watery fluid runs from the nose, the eyes begin to water, the child rubs them and they become inflamed, red and sensitive to light. These symptoms gradually grow worse until about the third or fourth day, when small spots, varying in size from a pinhead to a navy bean, begin to appear on the face, and in about twenty-four hours are scattered over the whole body. During the catarrhal symptoms there is very little if any fever, but as soon as the spots commence to show the temperature begins to rise, and continues to increase until the rash reaches its height; the fever then remains about the same for twenty-four to thirty-six hours, after which it gradually declines—lasting from three to six days.

The eruption is generally of a brick-red color, sometimes bluish red, but never scarlet. It is first seen on the forehead and chin, then spreads over the face and the entire body, giving it a rough feeling to the hand, and reaches its height in about twenty-four hours. As this rash peels off the other symptoms decline, excepting the cough, which is likely to continue harsh and dry until the rash disappears, and may last several weeks. Usually the time from the attack to full recovery is about two weeks. Measles alone is not a fatal disease, but it is liable to various accompaniments, which may lead to very dangerous complications, the most serious of which are bronchitis and broncho-pneumonia.

Treatment.—There is no way after exposure to prevent or abort measles. It will run its course. The treatment should be mild and guard against the appearance of other diseases. Great care should be used to prevent the patient from taking cold. He must be kept out of damp, cold air and all draughts. To a child five years old give two grains of muriate of ammonia every three hours, and, if the eruption is slow to appear, he may be put in a warm bath containing one tablespoonful of mustard to each two gallons of water. Let him drink freely of cold water, since it not only slakes thirst but reacts upon the skin. Warm drinks, such as sage and catnip tea, are also good to assist in bringing out the rash.

Keep the bowels open by mild remedies, such as Castoria, or tea made from senna, or, for a child of five years, a teaspoonful of Glauber's or Epsom salts, every four hours until the bowels move freely. It should be remembered that in this disease the bowels are easily influenced and that care should therefore be taken in the use of medicines. In case of diarrhea give from three to five grains of subnitrate of bismuth every four hours.

The eyes should not be used much, and if light irritates them the room should be darkened.

If the symptoms are grave and indicate bronchitis or pneumonia, give from one to three grains of carbonate of ammonia in a teaspoonful of syrup of tolu every two hours, or, if the case is less urgent, once in four hours. Moderately strong tea made from thoroughwort or boneset, well sweetened and hot, taken in large draughts, then covering the patient warmly to induce perspiration, is excellent in this complication, but it is hard to get small children to drink it.

Broncho-pneumonia begins as ordinary bronchitis and grows in severity; a snoring noise is made in breathing which increases in pitch and becomes a dry, ringing sound, as the disease advances; the fever is usually high and breathing difficult. Broncho-pneumonia is also contagious in its early stages, hence the patient should be separated immediately from the rest of the family, even if the others have already had measles. As a preventive measure and to protect the patient from secondary infection, Dr. Comby of Paris recommends spraying the mouth, throat and nose with a four per cent solution of boric acid once in six hours, and with the same kind of solution washing the genitals, anus and all parts of the body soiled by the dejections, every morning and evening. We will add that this is an excellent disinfectant, too, for measles, and that its use from the first is a wise precaution. The treatment includes anointing the pharynx and nostrils by inserting in them wads of absorbent cotton, covered with borated vaseline. This germ is short-lived and broncho-pneumonia is contagious during only the first two to four days after its appearance. Death from this malady may either occur soon or several months after recovery from measles.

As already stated, measles runs its course in two weeks, but from bad hygiene, previously weak and run-down condition of the system, or from the presence of tuberculosis, syphilis or other

specific taint, the recovery may be very much delayed and serious results ensue.

Throughout this disease, milk, soups and soft eggs are the best diet.

On the return to health precautions must be taken against catching cold, and warm flannels should be worn next the skin, for deafness, chronic bronchitis, enlargement of the tonsils and many other disorders are liable to follow even slight exposure at this time.

BLACK MEASLES.

This disease is only common measles in a very aggravated form. The malignancy is caused by previous poor health, or a depraved condition of the system. The blackish or purplish color assumed by the rash in this kind of measles is due to venous blood collecting in the capillaries near the surface of the skin, and shows that the blood is in an impure and sluggish condition.

RÖTHELN.

(German Measles.)

Rötheln is a specific, eruptive, highly infectious disease, in many points resembling both measles and scarlet fever, but with qualities quite apart from those diseases, besides differing from them in incubation, invasion and eruption. Its period of incubation varies from five to twenty-two days, and the time from the first symptoms to the height of the rash is from one to three days. The rash presents two principal forms, of which one resembles measles, the other, scarlet fever. In either form it is likely to leave one part of the body at the same time that it develops in some other part, and although it may disappear entirely in a day or two, it may remain four or five days.

There is catarrh as in measles, but in measles the rash is longer in reaching its height. In measles there is not much sore throat, and no enlargement of the glands of the neck; but in rötheln enlargement of these glands is the most prominent symptom, and there is also soreness and stiffness felt in moving the head. The sore throat in rötheln resembles that of scarlet fever, but in scarlet fever the constitutional symptoms are more severe, the rash is more diffuse, and the tongue presents a peculiar strawberry appearance. As in measles, the germ is short lived and

when the patient recovers he is no longer a source of danger to his neighbors. Neither disease is any protection against the other.

Treatment.—The same as for measles.

VARICELLA.

(Chicken-pox.)

This was formerly supposed by many to be a modified form of small-pox, but it is now positively known to be a distinct disease due to a specific germ, which, like small-pox, may be transmitted either with or without direct contact. It is a very mild disease, usually comes in epidemics, and never attacks one the second time. It is usually seen in children only, but now and then occurs in young or adult women.

The eruption is likely to appear in from ten to fourteen days, but may appear as late as eighteen days after exposure, and usually is the first symptom, but, occasionally, there are slight fever, headache and lassitude, and it may be a little cough, for twelve to thirty-six hours previously. At first the spots are few, and usually upon the body, especially about the shoulders and chest, but sometimes the eruption is abundant. It extends, as the disease progresses, to the limbs, face and scalp, and is likely to become quite copious upon the latter. The spots are likely to be separate, but occasionally become confluent to the extent of several uniting in one. For five or six nights fresh crops appear, so that the eruption becomes abundant and vesicles are present in all stages of maturity at the same time, in marked contrast to those of small-pox, which all mature at once; neither are they depressed in the center like those of small-pox, and when mature, if punctured, collapse completely. In some cases they are said to cause the skin to look as though it had been sprinkled with hot water. Sometimes the successive crops of vesicles continue to appear for ten or twelve days. Each vesicle either ruptures or dries up on the third to fifth day, the thin, crumbly scab rubbing off in particles, but occasionally a thick, tough crust is formed. Sometimes, but not often, distinct round or elliptical pits are left. A good deal of unpleasant itching is likely to be about the only disagreeable sensation.

Treatment.—The disease of itself is never fatal, and the only

treatment required is to keep the patient quiet, to restrict the diet to a few mild, easily digested articles of food, and to keep the bowels open. If there is fever it may be controlled, and the comfort of the patient promoted by a tepid sponge bath, repeated as often as may be required. All scratching should be restrained. If catarrh is present it should be treated. If the bronchial tubes become extensively affected the condition may be rendered dangerous, and an unsatisfactory state of health may cling to the patient for some time following an attack of varicella.

PAROTIDITIS.

(Mumps.)

Mumps is an acute, specific, infectious, self-limited disease of the glands of the neck known as the parotid glands, and sometimes of the testicles, breasts and vulva, and, rarely, of the ovaries. It is more common in boys than girls, and usually occurs between the ages of five and fifteen years, but sometimes attacks adults. Very young children are usually exempt. A person seldom has it more than once. It usually occurs in epidemics, and in the spring or fall.

The patient is attacked in from one to three weeks from the time of exposure. The first symptom is likely to be fever and general malaise, lasting from one to three days before the neck begins to swell and become tender, but sometimes the fever and swelling come at the same time. The swelling commences just below the lobe of the ear and back of the angle of the jaw, and extends in all directions, gradually increasing for two or three days until the neck and cheek are greatly disfigured. There is not likely to be much pain, but more or less uneasiness and a sense of tightness, which is increased by opening the mouth, chewing or swallowing; and it becomes difficult to speak or take food. About the fifth or sixth day the swelling begins to subside, and in two or three days more disappears; but as one side recovers the other is likely to become affected. In some cases both sides are attacked at the same time. A mild fever is usually present throughout the attack, but sometimes subsides when the swelling begins. The swelling may become very tense and hard, but it is quite rare that any pus forms. The hardness may last for some time, and gradually passes away.

In about one-third of the cases of mumps, in boys at puberty,

less often in those younger, one or both testicles are attacked; and more rarely in girls the breasts and vulva, and sometimes the ovaries, are affected. An inflammation in these glands is not always present with mumps, and, when it is, usually appears in them later than in the parotids; it was long thought to be due to metastasis, which means leaving one part of the body to appear in another. The most recent investigators regard this theory as wholly insufficient to explain the fact, and with a better show of reason maintain that when these glands suffer it is because of their infection with the same germs that attack the glands of the neck and that, although they are usually attacked later than the parotids, they are often attacked at the same time, in some cases are attacked first, and that there are cases in which inflammation of the testicles is the only manifestation of mumps. It is true that the inflammation is occasionally greater in one part, then in the other, alternating several times, but generally when it subsides in one part it does not appear in it again, and when it does return it is in the nature of a relapse, as from having taken cold. How the germs reach the testicles, and in fact any of the other glands, is not known.

Treatment.—The patient should be kept in a comfortable room and, if the disease be at all severe, he should be kept in bed. Not much treatment is usually needed, but care must be used to keep him from taking cold. It may be well to give a mild cathartic, preferably salts, to promote the action of the skin and kidneys. The bowels should be kept regular throughout the entire course of the disease. The application of hot fomentations to the swollen neck was long recommended as the best treatment, but many now prefer ice bags or cold compresses until they become uncomfortable, then to apply hot cloths for a little while, to be followed again with the cold, and so on alternately, until the inflammation subsides.

Should a soft place, indicating the formation of an abscess, appear in the middle of the swelling, hot fomentations only should be applied to hasten it as much as possible, and as soon as pus has formed the lance should be used. Warm sponge baths, followed by brisk rubbing with dry towels, are an advantage. Any hard places that remain when the swelling subsides may be removed by rubbing with oil. When the testicles, breasts, etc., are affected the patient should be kept quiet in bed and the same

treatment used as recommended for the neck. The inflammation may lead to a wasting of the testicles, but cases of this are rare and it usually subsides without any serious results. A suspensory bandage should be worn for the support of the testicles, when they are inflamed or swollen. Deafness sometimes, and meningitis very rarely, are caused by mumps.

PERTUSSIS.

(Whooping Cough.)

Whooping cough is an infectious disease, due to specific germs belonging to that class known as bacilli. The disease has been transmitted to animals by inoculating them with these bacilli.

Although the bacilli may be borne some distance in the air, the disease is chiefly transmitted through a close association with a patient suffering with it, the germs being given off abundantly in his breath and occurring also in his sputa and the secretions of his mucous membranes.

There are now and then isolated cases, but it generally occurs in epidemic form, and is most common between the ages of one and eight years, but children of any age are subject to it. It rarely attacks adults, and it has been found that girls are more frequently affected than boys of the same age. It generally runs its course in from four to six weeks, but in rare cases has been known to last three or four months.

Symptoms.—For convenience the symptoms have been divided into three stages: *First. The Catarrhal Stage.* The first symptoms are expected to appear in from six to fourteen days after exposure, but infants have sometimes shown the disease in three or four days. At the commencement there is usually some fever and signs of catarrh, such as running from the nose, sneezing, redness of the eyes and frequent fits of severe coughing. At the beginning the cough is dry, but it is soon attended with expectoration of a peculiar, tough, stringy, transparent mucus. This stage lasts from a few days to two or three weeks, or even longer, its duration and intensity indicating the probable length and severity of the entire attack.

Second. The Spasmodic Stage. In this stage peculiar fits of spasmodic coughing attended by whooping are the most prominent features. The coughing spells come on suddenly and are very severe. The child is likely to run to some near object and,

seizing it for support, to give a number of short, rapid, spasmodic barks or puffs, until the lungs are emptied of air, when a clear, shrill, whooping sound is heard, caused by a spasmodic condition at the entrance of the windpipe while air is drawn forcibly into the lungs. The coughing and whooping may be repeated a number of times in close succession until the child turns blue in the face, the eyes bulge out, the tears flow, the breath seems lost, and there is great exhaustion.

Each coughing spell generally ends with spitting a quantity of thick, sticky, clear fluid or mucus, and sometimes with vomiting. The coughing may be so severe as to cause bleeding from the eyes, nose, mouth, ears or rectum; or to produce hernia or rupture. The whooping above described is the most characteristic sign and when heard dispels all doubt as to the nature of the disease. In infants of less than six months, and in very mild cases in older children, whooping may not occur, but these patients transmit the disease to others as certainly as those who whoop. The diagnosis of a case of this kind must be determined by the fact of exposure, the nature of the coughing spells, which are likely to be more frequent at night, and the character of the expectoration. If with the cough the infant spits abundant mucus whooping cough is positively indicated.

Third. The Declining Stage. There is a gradual lessening in the frequency and violence of the coughing spells, expectoration becomes more easy, and the mucus thrown out becomes opaque or yellowish; vomiting ceases; the general health improves; little by little the coughing ceases until it is gone entirely; and the patient may soon be well, but the disease is so prone to relapse great care must be taken to guard against a secondary attack.

Treatment.—The patient should have two rooms, one for the day, the other for the night, and each room when not in use must be thrown open and most thoroughly aired, and both rooms at all times must be well ventilated. If impossible to give the patient two rooms, he should be covered up warmly in bed and his head protected from draughts and cold air by a shield, as that formed by a raised umbrella placed over him and covered with a blanket, while the doors and windows are thrown open, twice every day, until the room is well aired and again warmed to about 68 degrees, at which temperature it should be kept as nearly as possible. There should be a current of pure air passing through

the room at all times, care being used to protect the patient from draughts, and the bedding and clothing must be kept fresh and clean by frequent changes.

The patient should be dressed warmly with flannels next the skin, and if the weather is warm should spend much of his time in the open air. Long before the true nature of the disease was discovered, outdoor life was known to be much more favorable than a close room to an early recovery.

Moncorvo, who has had large hospital experience in the treatment of this disease, believes that it begins in the larynx, and applies resorcin to it with a throat brush having a flexible wire handle, introducing the brush four or five times at each treatment and using care to reach all parts in the back of the throat and about the glottis. By this method he claims to have been able to cut short an attack of whooping cough, often quite suddenly and in some cases within twenty-four hours. If the chemically pure resorcin cannot be obtained, he uses instead a ten per cent solution of citric acid as a spray by means of an atomizer.

Schmid advises the use of the following mixture as a spray every three hours, the nozzle of the atomizer being directed as far back in the mouth and throat as possible:

Carbolic acid	six grains
Menthol (4 per cent solution).....	four drams
Cocaine (3 per cent solution)	three drams
Glycerin	one dram
Cherry-laurel water	one ounce

In my own practice I use the following with good results:

Belladonna	one-half dram
Sodium bromide	one dram
Carbolic acid	sixteen drops
Glycerin	one-half ounce
Enough syrup of tolu to make two ounces.	

Dose.—One-half teaspoonful every two hours for a child two years old.

Braro thinks the essential oil of cypress an excellent remedy, and uses it by dropping some on the pillow and the patient's collar so that he shall constantly inhale it.

The best protection against attacks of other diseases is in

building up the general health and making the surroundings as perfect as possible.

The diet should receive careful attention and consist of liquid foods and be nutritious, and the bowels should be kept regular. Means should also be used to prevent the patient from throwing off the bed clothes at night and thus exposing himself to cold. A moist atmosphere, as that caused by steam escaping in the room, is desirable, and vapor baths and inhalation of steam are often very useful. The child should be taught to suppress coughing as much as possible, for, as it irritates, the more he coughs the more he will want to cough. Complete change of air, as a trip to the sea-shore, or a sea voyage, is often very beneficial, but respect for the rights of others and recognition of the dangers of spreading the contagion should prevent using any public conveyance for that purpose.

Many careful investigators have inclined to the opinion that whooping cough is an auto-infectious disease, that is, that a patient when nearly well may become infected again, from germs thrown off by himself, and consider that the demonstration of this fact, first advanced by Musser, explains many of the most serious, prolonged and relapsing cases, but this view is not fully established, and the weight of authority is that the relapses are caused by exposure to cold, in some cases very slight.

SPASMODIC OR FALSE CROUP.

Other names for this disease are Catarrhæi Spasm of the Larynx, Spasmodic Laryngitis and Catarrhal Croup. It is a disease which may occur at any time, but is most prevalent during spring and autumn, when the weather is changeable and rather cool. Infants between six months and three years old are most frequently affected, although it is occasionally met in older and in younger children. There are certain ones who are prone to the disease, especially rachitic children, and one attack is very apt to be followed by another. Some families have it more often than others, although it is not contagious and cannot be communicated from one child to another. Enlarged tonsils and adenoid growths in the pharynx predispose a child to false croup. The disease attacks the larynx just above the vocal cords.

Symptoms.—At first there is a dry condition of the throat which is followed by an abundant secretion of mucus. The

symptoms are so marked and peculiar that anyone who sees a case can always recognize it thereafter. The child goes to bed as well as usual, or with a slight cold, which shows itself by a little hoarseness and, perhaps, by a slight running at the nose, the throat may be a trifle sore, and sometimes there is just a little fever. Having slept until about midnight the child suddenly awakes with a deep, hoarse, choking cough, and every inspiration labored, hoarse and noisy. The face usually has an alarmed expression, and the patient often clutches at its throat as if to remove some obstruction there. At times it grasps the bedstead or the bed-clothes, or if its mother is near clings to her, as if that afforded relief. Sometimes the distress is very great, but at other times it may not be enough to keep the child awake. There may be a slightly livid condition of the lips and fingers, but at other times the child is pale. Perspiration starts from the face and body and there is presented a most distressing picture.

The attack may last from one to four hours, and when it subsides the child goes back to bed and to sleep, although there is still some hoarseness in its breathing. Frequently a second attack will come on the next night, similar to the first but less severe. The third night seldom brings another attack, and from this time the child rapidly recovers, and in from four to seven days is well. It does not appear very sick except during the attack and the fever seldom rises above 101 degrees. Another attack is very apt to occur the first time that the child takes cold.

False croup may be confounded with true or membranous croup and laryngismus stridulus. From membranous croup it is distinguished by the sudden and nightly onset, also by the mildness of the symptoms after the acute attack, and their daily remission. There having been a previous attack aids in the diagnosis. The inhalation of chloroform quickly relieves in false croup, but affects membranous croup very little.

False croup is distinguished from laryngismus stridulus by the facts that the latter attacks infants only, that it sometimes stops the breathing entirely, and its attacks come on many times a day and may continue for weeks.

In false croup the outlook is very favorable, as it is doubtful if death ever occurs from it, unless it be complicated with some other disease.

Treatment.—This consists of the prompt use of emetics,

steam and hot fomentations around the neck. Hive syrup or the compound syrup of squills is the remedy most frequently used, and it should be kept on hand constantly when in the family there is a child subject to this croup. One-half teaspoonful can be given a baby one year of age every ten or fifteen minutes until vomiting occurs, or until the distressing symptoms subside. It is well, at the same time, to wrap a flannel cloth wrung out of hot water around the throat, and if the croupy breathing continues to have the child breathe steam. This may be accomplished by making a sort of tent over the child with a sheet and allowing steam from boiling water to flow into it; or a large cone can be made from a newspaper and held over the spout of a tea-kettle, and the child allowed to breathe the steam escaping from the small end of the cone, care being used that the steam shall not be hot enough to scald the patient.

The following prescriptions are useful, either during the severe attack or after it:

Wine of ipecac	one dram
Tincture of aconite	two drops
Syrup of tolu	three drams
Liquid acetate of ammonia	one ounce

Dose.—One teaspoonful every two hours to a child of three years.

Antipyrin	sixteen grains
Syrup of ipecac	one dram
Bicarbonate of soda	sixteen grains
Syrup of tolu.....	enough to make two ounces

Dose.—One teaspoonful every two hours to a child three or four years old.

SCROFULA.

Scrofula is a disease of the lymphatic glands, usually those of the neck, which are thereby caused to enlarge and suppurate. The affection is so well known and so easily recognized that a description is hardly necessary.

Causation.—Scrofula is really a form of tuberculosis, being a tuberculosis of the lymph glands, as consumption is a tuberculosis of the lungs, and hip-joint disease a tuberculosis of the hip-joint. All are due to the germ known as the bacillus tuberculosis. The

disease is very often hereditary, and attacks children between the ages of three and ten almost exclusively. Although so frequently handed down from parent to child, there are other factors which aid its development in those having the hereditary taint; such as a cold, damp climate, poor food, bad air, crowded tenements, and, in short, whatever tends to lower the vitality of the body. It is a disease frequently seen in the overcrowded poor quarters of the city, but rarely in the pure air of the country. It may be brought on by tonsilitis, measles, scarlet fever or influenza.

Symptoms.—Scrofula is always a chronic affection. In the great majority of cases the glands of the neck only are affected, but it sometimes involves those of the arm-pit and groin. At first the only symptom is the swelling of the glands of the neck, and both sides are usually affected, though one side may begin first or grow more rapidly. The enlargement does not go on continuously, but at times increases rapidly (in which case the affected glands are often painful), then again remains stationary. The progress of the disease is very slow, lasting from several months to several years, three and a half years being the average duration. The glands generally reach considerable size in three or four months, and although at first they are smooth and regular in shape, and move freely under the skin, later they grow into the surrounding parts, become immovable and take on irregular nodular shapes. When a chain of glands is affected, the course is slower and the glands do not adhere to the neighboring parts.

Suppuration takes place in from one-half to two-thirds of all cases. The cases which do not suppurate improve about the age of puberty. When the tumor breaks down and discharges pus, there is formed a large open ulcer which is extremely difficult to heal, and when finally healed leaves a large, irregular, unsightly scar, which may break down into another ulcer. Such scars may contract to form prominent ridges which are as sensitive and painful as burns. A child with scrofula may be otherwise healthy and remain in good condition throughout the disease.

Prognosis.—This is not a fatal disease, and though the case may drag on for eight or ten years, recovery can be safely predicted; neither does it often lead to tuberculosis of the lungs, but sometimes does.

Treatment.—The treatment must be much like that of other forms of tuberculosis. A dry climate and a moderately high

altitude are helpful. Plenty of pure air and nourishing food are necessary. Of medicines, cod liver oil and the syrup of iodide of iron are the best combination, a dessertspoonful of the former with twenty to thirty drops of the latter, three times a day, may be given a child of five years. An emulsion of cod-liver oil may be more readily given a child, but it is not as efficient as the pure oil.

The enlarged glands will often require the attention of a surgeon. When pus forms in a gland it should not be allowed to go on till it breaks, but should be opened at once, for thus, by a simple, timely operation, the course of the disease may be shortened, and the formation of ugly, disfiguring scars prevented. Poulticing and painting with iodine are harmful.

RACHITIS OR RICKETS.

Rachitis is a disease of nutrition and is characterized by changes in the bones and a variety of nervous symptoms. It is largely a disease of infancy, particularly of children from six months to three years of age, but may occur earlier and sometimes later. It is far more frequent in the city than in the country, and among the poor than among the well-to-do. It seldom occurs in a child nursing a healthy mother, and is most likely to be found in one poorly cared for and fed upon improper food, especially food that is deficient in fat. Infants under one year of age that are brought to the table and fed the same food as adults are prone to the disease. While there is no evidence that rachitis is inherited, children born of weak parents, or parents infected with syphilis or tuberculosis, or having some purulent discharge, are more susceptible than those of healthy parentage.

Symptoms.—The symptoms are many and varied, but certain ones are most likely to occur, and upon these we can usually base a diagnosis. The first one noticed is persistent fretfulness. The child acts as if it were sore all over, and any pressure or sudden movement makes it cry. Its sleep is intermittent and disturbed and there is often a little fever at night. The child also sweats at night, or whenever it sleeps, the perspiration being especially profuse about the head. In its restlessness it is apt to throw off the covers, and, being wet with sweat, to take cold. Indeed, catarrhal diseases of all kinds, whether they affect the nose, throat, lungs, stomach or intestines, are frequent and severe

in a rachitic child. It is pale and sometimes sallow. The veins about the face are enlarged and plainly visible. Craniotabes (a thinning of the bones of the skull) sometimes occurs and is a serious symptom, because it often excites disease or injury of the brain. If such a child is laid upon a bed with a hard pillow, the weight of its head causes pressure on the brain that may give rise to severe symptoms, and always causes it much pain. It is always desirable to change the position of such children often, for they are usually so young as to be unable to do it for themselves. It is probably this condition which makes rachitic children so susceptible to nervous diseases of all kinds. Convulsions are frequent among them, and at times tetanus occurs; the teething is retarded; the fontanels remain open until the child is two or three years old, and walking, and even creeping, is long delayed and difficult.

To the bones the rachitic condition proves extremely disastrous and many and severe are the deformities. These result from inability of the bones during the rachitis to appropriate the lime salts, which form the hard part of the bones, and they therefore soon assume a gristle-like condition, so that nearly every bone in the body is liable to become bent out of shape. Those of the legs bend out or in, giving rise to bowlegs, and sometimes the shin-bone bends forward. The chest is likely to become distorted into the so-called pigeon breast, or an unsymmetrical one. The head bones also may bend and cause a square-shaped head, or one with protrusions, making it look abnormally large.

If these deformities become fixed, and they usually do after the third or fourth year, a surgical operation is needed to correct them. Much can thus be accomplished. The bone is cut or broken and done up correctly, and when the new bone forms, between the severed ends, it fixes the bone in the proper position. Earlier than the third or fourth year the legs and arms may be bent and held in position by braces until they become fixed by new bone formation.

Rickets is not of itself a fatal disease. Its great danger lies in the deformities it causes, and its tendency to increase the liability to other diseases of a severe and dangerous character. It is said that in Europe nearly thirty per cent of the infants show some symptoms of rachitis, and in the large cities of America the number thus affected is about twenty per cent. It is therefore

desirable that we be able to early recognize the disease and begin its treatment promptly.

The best treatment is the preventive treatment, and that consists of giving the proper food at proper times in proper quantities amid the best possible hygienic surroundings. These things have been treated under the heads of "Infant Feeding" and "Diet of Infants," and to these the reader is referred. It is also of great importance that the mother while carrying the babe should have good care. Good, nourishing food, fresh air, proper baths and abundant sunlight, all are necessary for her.

After the disease has become established, medicinal treatment is important, and, fortunately, it is usually effective. As there is indigestion as a rule, some digestant is desirable, as pancreatin and soda, or papoid tablets, one after each meal. In older children pepsin and muriatic acid are at times better—Parke, Davis & Co.'s Pepsin Cordial, a teaspoonful before each meal. For infants, maltine with hypophosphites of lime, iron and soda is excellent, both as a tonic and as a digestant of the starchy foods. One of the emulsions of cod liver oil is recommended, not only on account of the fat it contains, but also for its bile salts. Parke, Davis & Co.'s Egg Emulsion is especially useful, as it possesses food qualities also. Some form of phosphorus is useful in this connection to help the formation of bone, and Fairchild Bros'. Elixir of Calisaya Phosphorized is a valuable one, being a good tonic in addition to its phosphorus. Everything should be done to promote a good, healthy action of the digestive organs and increase the nutrition of the child.

OBSTETRICS,

OR THE CARE OF WOMEN IN PREGNANCY, CHILDBIRTH AND
RECOVERY.

By IDA C. BARNES, B.A., M.D.

CHAPTER I.

In studying the subject of obstetrics, the phenomena attendant upon pregnancy and childbirth will be considered, as also the relation of the fetus to the maternal surroundings.

Whenever to a woman comes the opportunity of presiding over a home of her own, consequent upon matrimonial obligations, she must consider the almost certain, and certainly to be desired, family which shall surround her in a few years, her own mental and physical adaptation for such duties, and the fitness of the man, mentally, morally and physically, whom she accepts as the father of her children. If with tastes and mental attainments more or less in opposition, there is yet a broad-minded tolerance of the opinions of others, there may be a most pleasant marriage; but if a spirit of intolerance exists, sooner or later there will be discord to mar the otherwise pleasant relation.

People debilitated by constitutional disease, either hereditary or acquired, ought not to entail their tendency to weakness upon the oncoming generations, and should make every effort for as complete restoration to health as possible. Much can be done by proper living to increase the power of resistance to exposure and disease, and it is the great duty of all, by working towards this end, to raise both the physical and mental standard of the human race. A nation is not what its strongest men are, but what its countless thousands average in ability and strength, and it should be remembered that all excesses, whether in the pursuance of pleasure or gain, that sap the health and impair vitality will prove a curse to those to come.

PELVIC ANATOMY.

Preliminary to the consideration of obstetrics, it is important to understand something of the anatomy of the pelvis—the great

bone framework of the lower part of the body—and its adaptation to childbirth. It is composed of four bones: The two os innominata or “hip bones,” forming its two sides and, by uniting, also forming its front; the sacrum (consisting of five joints of the spinal column fused together into a single bone) forming its rear, and the coccyx (the rudimentary human tail composed of the last four sections of the spinal column, also fused together into one bone) attached to the lower end of the sacrum and helping to form the pelvic cavity, although not a part of the pelvic brim. In addition to these, the obstetric pelvis also includes the last lumbar vertebræ (the sections of the spinal column just above the sacrum).

Complete union of any of these bones does not occur until the twentieth year, the sacral and coccygeal segments fuse still later, and the sacro-coccygeal joint does not unite until middle life. Do not be frightened by these large words; they simply mean that during the larger part of the child-bearing period, there is more or less elasticity of the joints, capable of being utilized during childbirth.

The mechanical part of labor resolves itself into two factors which may be expressed as follows: The size of the natural pelvis, with the possibilities of expansion under pressure, and the size of the fetal head, which is the largest part of the fetal body, with the possibilities of compression under pressure.

PELVIC DEFORMITY.

Like other portions of the body, the pelvis is modified by heredity and mode of life. The pelvis of the average American woman, though not presenting the striking deformities found in some countries, is not perfect, and protracted labor is often due to some failure of development which has destroyed symmetry and lessened a diameter at a point where full size is most needed to promote an easy delivery. A lack of nutrition before birth may be followed by a similar deficiency after birth, from which all the bones suffer imperfect development, and the pelvis, by a diminished capacity, is so seriously crippled as to be unfitted for child-bearing. Again, a pelvis may present a fair degree of symmetry, yet be so contracted in all its diameters as to seriously diminish the size of the birth canal. During infancy and childhood the bones are so soft and pliable that continued pressure upon any

point will deflect some bone from its natural inclination and change the angle it should form with some other bone, and thus may seriously interfere with the function of childbirth or labor.

Then there is the flat pelvis, narrowed from the front back; and the funnel-shaped, due to restrained growth, resembling the infantile and the male pelvis. The pelvis of the female is essentially like that of the male until puberty (about the fourteenth year of age), when the uterus and ovaries develop rapidly and the bones of the pelvis enlarge and expand; while the male pelvis remains deep and narrow, and its bones increase in strength and firmness. A partial dwarfing of the body often results only in lack of pelvic development, and the formation of a frame not totally unfit for maternity, but which will not permit normal labor. An oblique pelvis may be caused by a deformity in the spine or hip, or a shortening of one leg by improper standing or sitting at work or study. In early infancy, any of the pelvic deformities may be caused, in an otherwise healthy individual, by allowing the baby to sit or stand before it is able. Improper feeding may result in soft bones that will bend under the burdens borne by the average child of the same age. A woman with crooked bones may, with comfort to herself, accomplish the ordinary duties of life, but she cannot bear a child through a deformed pelvis without great suffering and much peril to herself and babe. Shall not woman crown her highest physical endowment with as perfect development as possible?

Although heredity may have marred with sad defects, it lies within the power of every individual, by careful and wise observance of nature's laws, to greatly modify the baneful results. Diseases, especially those caused by lack of nourishment in early life, play havoc with the bone framework of the body, and here again, unless great care be taken, the female pelvis will suffer as regards child-bearing; it may be one-sided, narrow or flat, yet not seriously interfere otherwise with its relations to the rest of the body.

THE ORGANS OF GENERATION.

The immediate organs of generation, or child-bearing, are the ovaries and the uterus, or womb, situated just above the plane of the strong muscular floor of the pelvis, and connecting with the external organs of generation by means of the vaginal canal, which penetrates this floor in its front portion. The external organs of generation are the mons veneris, the labia majora

(greater lips) and labia minora (lesser lips), the clitoris with its prepuce, and the vestibule upon which is found the urethral opening.

The labia majora are two thick folds of hairy skin extending from the symphysis pubis backward to within an inch of the anal orifice, each lip having an outer and an inner surface, and including within its folds blood vessels and a quantity of fat. When they are best developed they unite in front in what is known as the mons veneris, while posteriorly they join in a mere fold of skin known as the fourchette. In the adult the outer surface of both lips is thickly covered with hair.

The labia minora are two thin oblique folds of skin on the inner surface of the larger lips, and blending with them at about the middle of their inner surface behind, but in front separating each into two folds, of which one unites with the corresponding fold of the opposite lip to form the prepuce of the clitoris, while the other joins with its opposing mate to form the suspensory ligament. As a rule the smaller lips do not project beyond the larger.

The clitoris, covered by its prepuce, lies in the middle line and at the apex of a piece of mucous membrane called the vestibule—a smooth triangular surface bounded above by the clitoris, at the sides by the lesser lips, and below by the upper edge of the vaginal opening. In the middle at the base line can be seen the urethral orifice. There are mucous glands also upon its surface.

The pelvic floor is a thick, fleshy, elastic layer of tissues attached to the bony pelvic outlet, on the outer skin aspect of which lie the external organs of generation just described, while on its inner, peritoneal surface lie the uterus and its appendages—the Fallopian tubes and ovaries.

The vaginal opening lies in the middle line between the lower edge of the vestibule and the uniting folds of the larger lips behind. Stretched across the rear part of this opening and partially covering it is the hymen, which consists of a thin fold of mucous membrane strengthened by some connective tissue, with blood vessels and nerves. It varies in shape, and is generally, though not always, ruptured at the first copulation, and it may remain intact even until childbirth arrives, then become a source of obstruction; but usually it is easily ruptured. It may be attached to the lower edge of the vaginal opening, or it may be attached all around and

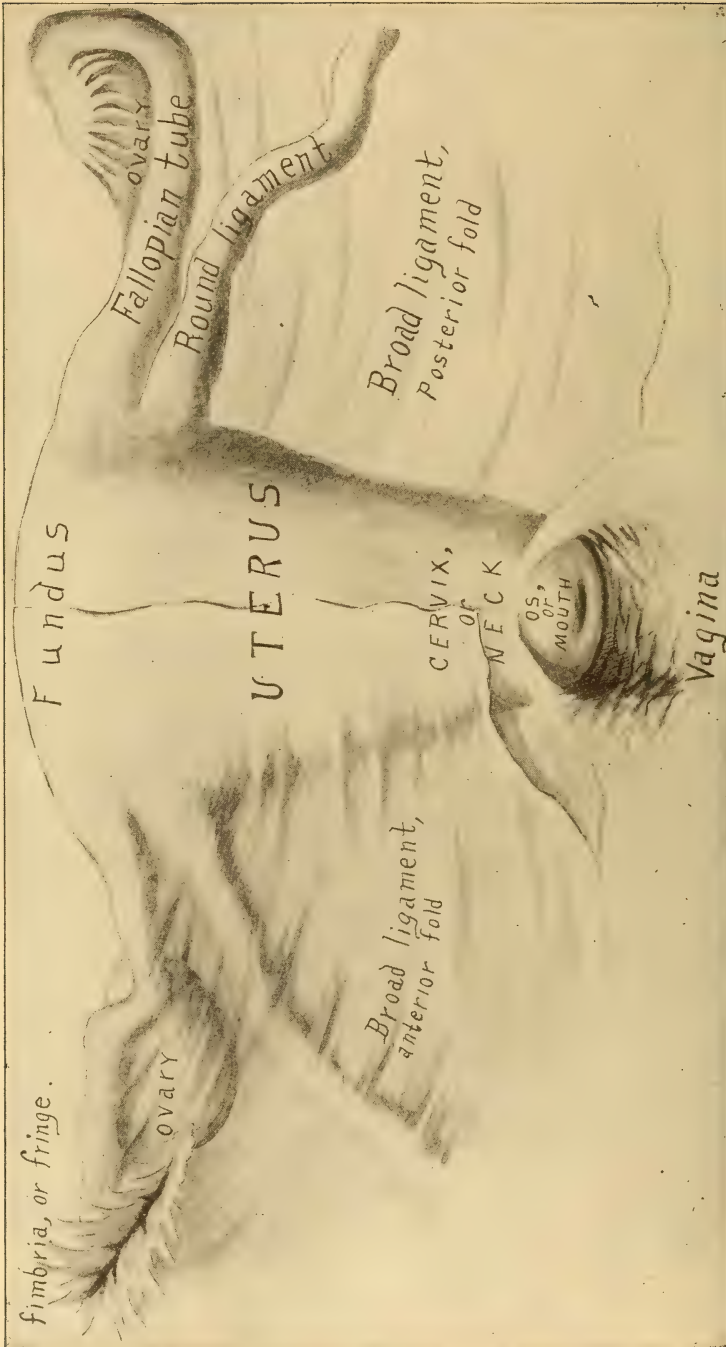
contain a small hole or vertical slit. Sometimes it has no opening, in which case abnormal conditions result.

The vagina is a muscular membranous canal, lying chiefly within the pelvis, its lower end passing through the pelvic floor. It rises at an angle of 60 degrees with the horizon, when the body is in the erect position, and is in relation with the bladder and urethra in front, and the rectum behind, being separated from them only by partitions called the vesico-vaginal and recto-vaginal septa. The vagina extends from the external opening below to the neck of the uterus above, and is very dilatable as by manipulation or childbirth. Its front wall is about two and a half inches in length, its back wall nearly three inches, and, ordinarily, the two lie in contact. Its walls are composed of mucous membrane and a muscular and fibrous coat, and are abundantly supplied with lymphatics, blood vessels and nerves.

The female urethra is short, being only about two and two-thirds inches in length; it lies beneath the front bone of the pelvis and is firmly imbedded in the front vaginal wall. The bladder bears an important relation to the vagina and uterus. When empty and relaxed it lies entirely within the true pelvis behind the pubes (the front part of the two pelvic bones known as the os innominata), and usually to one side. When filled to its greatest capacity the bladder, together with the peritoneum, is pressed well above the pubes, and has a consequent tendency to backward displacement of the body of the uterus. As disorders of the rectum are often important factors in uterine disturbances its location should also be remembered. It extends from the upper part of the left side of the pelvis to the anus; and in its course curves backward and inward. The anus, its external opening, is about an inch in length.

THE UTERUS AND ITS CONNECTIONS.

In shape the uterus is a triangular ovoid, consisting of a body and neck, and containing a cavity whose front and back walls rest upon each other. At each of its three angles there is an opening—the Fallopian tubes at the two upper ones and the vagina at the lower end. The neck of the uterus (cervix) opens into the uterus above and into the vagina below, and is divided into two portions, the vaginal, which extends down into the vagina, and that above the vagina. The virgin uterus measures about three inches in



THE FEMALE GENERATIVE ORGANS.—(Front view, natural size) with the anterior fold of the broad ligament on the left side removed, the front of the upper portion of the vagina turned back, the fimbriae of the left Fallopian tube grasping its ovary, and the round ligament, Fallopian tube and ovary of the right side lying in their normal position between the anterior and posterior folds of the broad ligament.

length, one and a half inches at its greatest width, and one inch in thickness, and consists of two portions—the body and neck. The proportion between them varies with age. In the adult virgin the two parts are nearly equal, while in early life the neck preponderates over the incompletely developed body; after childbirth the body remains nearly twice its original size, and in old age the organ becomes diminished to less than its virginal proportions. The cavity of the uterus is narrow and cleft-like, while that of its neck tapers at both ends and is bounded by the internal and external mouths, the internal mouth being the point of greatest contraction of the uterine canal.

The uterus is composed of a serous or external coat called the peritoneum, which covers only partially its external surface; the mucous membrane which lines the cavity of the body and neck, and the muscular layer which is between the other two, makes up the largest part of its constituency, and is of peculiar interest to the obstetrician because of its adaptation to the function of expelling the mature fetus, also because the contraction of this circular layer of muscular bands closes large blood vessels, thus preventing serious hemorrhage after childbirth.

The uterus is held in place by the broad, round, utero-sacral and utero-vesical ligaments. The broad ligaments are formed by layers of peritoneum, which partially cover the uterus in front and behind, and at the sides extend outward and somewhat backward to the sides of the pelvis. In the upper free margins of these ligaments are found the Fallopian tubes and the ovaries, and between the layers of the ligaments lie connective tissue, muscles, blood vessels and lymphatics.

When the uterus is in a normal position, that is, inclined slightly forward, the broad ligaments extend out laterally and backward nearly horizontally, but displacement of the uterus causes their displacement, and in pregnancy they are drawn upward until they assume an almost vertical position. By scarring and contracting the tissues, attacks of inflammation may also draw the uterus to one side and move the ligaments from their natural position.

The round ligaments are two in number, and, attached to the upper part of the uterus, extend obliquely forward and fasten to the front part of the pelvic bones. They receive lateral support from the folds of the broad ligament through which they pass.

The utero-sacral ligaments are folds of peritoneum extending from the lower part of the sides of the uterus, backward to the second sacral vertebra. The peritoneum, as it passes between the uterus and the bladder, forms the utero-vesical ligaments.

The mucous membrane lining the cavity of the uterus is, in the unimpregnated, about one-twenty-fifth of an inch in thickness, and is set upon the muscular layer without any intervening sub-mucous tissue. There are numerous glands. The mucous membrane lining the uterus is different from that lining its neck, and that covering the vaginal portion of the neck externally differs from both of them.

In normal position, the uterus is toward the front of the pelvis, supported, as we have seen, by flexible ligaments on all sides, and, resting with its top against the bladder, bends further forward when that organ is empty, and straightens up with its distention. The great pliability of the uterus, designed as it is for the protection and nourishment of the fetus during intrauterine development, renders it peculiarly liable to displacements and malpositions.

The Oviducts or Fallopian Tubes extend from the upper angles of the uterus, within and along the free margins of the broad ligaments for a distance of about four inches to the sides of the pelvis and the vicinity of the ovaries, where they end in expanded, funnel-shaped openings surrounded by a series of fringed processes called fimbriæ, one special fimbria running to each ovary. The function of the oviducts is to catch the ova as they come from the ovaries, and convey them to the uterus, and, preparatory to this, their fringed extremities have the peculiar faculty of attaching themselves to the ovaries whenever an ovum has ripened and is about to be expelled.

The oviducts have the three coats, serous, muscular and mucous, common to all cavities. The epithelium which lines these tubes is continuous with the epithelium of the peritoneum which lines the abdominal cavity, and thus indicates one source of infection from the outside to which women are liable and men are not, since in the male sex the peritoneum is a closed sac. The caliber of an oviduct where it enters the uterus, which is its narrowest point, will scarcely admit a bristle, but it gradually expands toward its outer extremity, where it becomes from fifteen to twenty-five hundredths of an inch in diameter.

THE OVARIES.

The two ovaries are flattened ovoid masses, usually about one and a fourth inches long, three-fourths of an inch wide, and a half inch thick, attached in front to folds of the broad ligaments which extend from the uterus to the sides of the pelvis. The smaller end of each ovary is also united to the uterus by a muscular band called the ovarian ligament, and a small ligament running from the oviduct to the side of the pelvis gives additional aid in retaining the ovary at its proper level in the pelvis. It may thus be readily understood that contraction or relaxation of these ligaments leads to serious results in the form of displacements.

Each ovary consists of the cortex or outer part and the medulla or central mass. The cortex includes the Graffian follicles, which are the most important part of the ovary, for within them are formed the ova (eggs). These are found in all stages of development, but when mature the follicle reaches the surface of the ovary and its ovum escapes through a rupture of the sac. The production of ova is very nearly complete at birth, few being formed later, and perhaps none after the second year. The ovaries of the child, therefore, possess the full quota, estimated at about 70,000. It is probable that a variable number of them reach partial development before puberty, but at the arrival of sexual maturity the full and regular development of the Graffian follicles and their ova begins, attended by menstruation. During the child-bearing period these follicles are constantly developing and end by bursting, thus liberating the ripened ova, each follicle producing one ovum. It is thought that this liberation of the ova coincides with the menstrual periods, although it has been shown that ovulation may take place independently of it. The ripened human ovum is a spherical cell about seventy-five thousandths of an inch in diameter, containing granular protoplasm in which lies a nucleus (the germinal vesicle) containing a nucleolus (the germinal spot).

RELATION OF OVULATION AND MENSTRUATION.

At regular intervals during the child-bearing period the lining of the uterus undergoes changes, designed to prepare a favorable resting place for the ovum in case of conception. The menstrual cycle, usually occupying twenty-eight days, may, according to Marshall, be divided into four stages, as follows:

(1) The constructive stage, a preparation for the reception of the ovum, during which there is swelling of the mucous membrane, enlargement of the uterine glands and increase of connective tissue. This stage lasts about a week, and when pregnancy does not occur is followed by:

(2) The destructive stage, in which there is a discharge of mucus, blood and disintegrated mucous membrane. Five days is the usual length of this period.

(3) The reparative stage, in which the deeper, unaffected portion of the uterine mucous membrane forms a superficial membrane. This period lasts about four days.

(4) The quiescent stage, including the remaining twelve to fourteen days preceding the beginning of the next cycle.

The relation of ovulation and menstruation is of much interest. It has been proven that menstruation can take place without the liberation of an ovum. Marshall believes that the constructive stage is related not to the ovum of that period, but to the one discharged during the preceding cycle. The congestion of the ovaries attending ovulation leads to stimulation and engorgement of the uterus, which no doubt is a cause of menstruation.

FERTILIZATION OF THE OVUM.

The ripe ovum is ready as soon as it leaves its follicle for fertilization by the spermatozoön, or male element. The process usually takes place in the upper portion of the oviduct. The period during which the human egg retains the possibility of fertilization is estimated at about eight days, since the death of the unfertilized ovum usually occurs before reaching the uterus. The union of the male and female pronuclei (generative elements) results in the formation of a new nucleus, called a segmentation-nucleus, in which the process of cell division at once begins and multiplies until membranes, tissues, organs, bones, nerves and muscles are formed and properly adjusted to make a perfect physical being. In this union of the male and female elements to form the first cell we see why the child should partake of the characteristics of both father and mother.

STAGES OF THE EMBRYO AND FETUS.

Very few human ova have been examined in their first stages, the earliest reported being at the twelfth day. This ovum had

become a flat, elongated vesicle one-fifth of an inch in length and one-eighth of an inch in thickness. A patch of thickened cells formed a rudimentary layer. The earlier processes of cell division have never been observed in the human ovum. On the thirteenth and fourteenth days the expansion for the head first becomes apparent. In the third week the form of the embryo becomes more definite, brain and optic vesicles and auditory sacs are distinguished, and by the twenty-first day the first rudiments of limbs appear. The fourth week is marked by increased size and more distinctive features; growth being more active at this period than at any other. With the third week the embryo is straight, but in the next few days the curves characteristic of the fetus are formed very rapidly. The individual brain cells, eyes, ears and nose, as well as the arches and furrows for the chest and abdomen, appear; the heart has increased in size and the limb buds have become more prominent. During the latter part of the fourth week a series of prominences along the line of the back is seen, indicating the position of the spine.

The fifth and sixth weeks add to the size and general growth. The limbs are the most characteristic feature of the period, their buds developing into distinct parts. Toward the close of the fifth week the flattened terminal parts, representing the future hands and feet, show thin marginal plates and soon exhibit traces of fingers. The upper limbs appear sooner than the lower ones. By the middle of the sixth week the fingers project beyond the hand, although the toes are just beginning to be outlined. The general development of the embryo has steadily continued; the head, although proportionally large, has gained little in size; the boundaries of the mouth are located, and the external parts of the eye, nose and ear are well advanced, the bend in the neck is disappearing and the face shows distinct advancement; the limbs project from the body and the fingers, thumbs and toes are well defined.

At the close of the second month the fetus is from one to one and three-eighths inches long and weighs from three-fourths of an ounce to an ounce. The third month establishes the human form, but the head greatly predominates in size; the limbs have definite shape and imperfect nails are found upon the fingers and toes. During this month the external organs of generation become distinct, although they made their appearance several

weeks earlier. At the end of the period the fetus measures two and three-fourths inches in length and weighs about four ounces.

Fourth month: Short hair appears on the scalp and other portions of the body. The eyelids, nostrils and lips are closed, the anus opens and the coil of intestines, which before extended into the umbilical cord, now lies within the abdominal cavity. The head forms about one-fourth of the entire body, and the bones of the skull, though hardening, are still widely separated. The sexual distinction in the external organs is well defined. At the end of this period the fetus weighs about seven and three-fourths ounces and is five inches in length.

Fifth month: The heart, liver and head are unduly large; the small intestines show traces of bile (a pale, yellowish green color); the lower extremities are longer than the arms; the nails are well formed, and hair is plentiful but without color. At the end of this month the fetus is eight inches long and weighs a pound. Its movements are plainly felt by the mother.

Sixth month: The surface of the fetal body is much wrinkled; the sebaceous coating, composed of oily secretion and epithelial scales, is beginning to appear, and protects the skin from the amniotic fluid; eyebrows and eyelashes are also appearing. The length of the fetus at the end of this month is twelve inches and its weight about two pounds. It is possible for children at six months to live, but they very seldom do.

Seventh month: The subcutaneous fat makes the fetus appear somewhat plump; eyelids permanently open; the liver is comparatively large; meconium occupies the large intestine; the testicles have descended to points even with the inguinal canals. About half of the children born at this time live. The fetus is now fourteen inches long and weighs three pounds.

Eighth month: There is increase in bulk rather than weight; the skin becomes a brighter flesh color; the scalp is supplied with hair; the nails almost reach the finger tips; the vernix caseosa forms a complete coating; the subcutaneous fat is increased. At the close of this month the fetus measures sixteen inches and weighs four to five pounds.

Ninth month: At full term the fetus has a well rounded body; the skin is less highly colored; both testicles have descended into the scrotum, and in the female the greater labia are in contact; the intestinal tract contains the dark greenish meconium;

the navel is almost in the center of the body. The full-term fetus is twenty inches in length and weighs from six to seven pounds.

(a) Young mothers have the smallest children, and mothers between thirty and thirty-five years the heaviest.

(b) The weight of the child increases with the number of previous pregnancies, if all of the same sex, that is, the first child is usually smaller than the next.

(c) The weight of the child increases with the weight and length of the mother. All causes adversely affecting the physical condition of either parent may exert an unfavorable influence on the vitality and development of the fetus.

CHAPTER II.

CHANGES IN THE MATERNAL ORGANISM CAUSED BY PREGNANCY.

As soon as the impregnated ovum escapes from the oviduct into the uterus it is caught by folds of the mucous lining which, with the membrane formed from the ovum itself, surrounds the germ and furnishes protection and nourishment. During the first three months small blood vessels of the mucous membrane of the uterus, enlarged for the purpose, unite with similar vessels of the fetal membranes, and thus furnish proper nourishment; but after this time there is a special development of a small portion of the uterus, usually near its top, in which these vessels become enormously enlarged, and communicate with similar vessels in the fetal portion of the placenta, after which the entire blood supply comes from this source and the small capillaries over the other parts of the uterine membrane contract and close up. The maternal vessels of the placenta are supplied with twigs from the uterine artery and the placenta is drained by minute branches connecting with the larger uterine veins.

The human placenta, as seen in the expulsion of the after-birth, is about eight inches in diameter and one and a fourth inches in thickness.

The placental blood vessels are the two umbilical arteries and one umbilical vein which extend from the placenta through the umbilical (navel) cord and are continuous with the circulatory system of the fetus. The umbilical cord is made up principally of these vessels and a peculiar substance known as the jelly of Wharton. It is usually about twenty-two inches in length and a half inch thick. The amniotic liquid secreted from the amniotic sac surrounding the fetus, sometimes called the bag of water, increases as the pregnancy advances until it may reach a quart in quantity. It preserves the fetus from harm and furnishes a liquid medium from which it may absorb the necessary fluid.

The enlargement of the mucous membrane of the uterus, which takes place on the liberation of a ripe ovum from the ovary, is increased when impregnation occurs, but the greatest change is in the size of the uterus, which from the rigid and tense virgin organ, two and three-fourths inches long, one and three-fourths inches wide and one inch thick, is transformed at the close of gestation into a soft, pliable sac fifteen inches long, ten and three-eighths inches wide and nine and three-fourths thick; and from a weight in the virgin of one and a fourth ounces is increased to two pounds, with its capacity enlarged to about eight pints.

The blood vessels of the vagina increase in size and there is thickening and softening of its mucous membrane and muscular tissues. The larger amount of blood gives the vagina a dark bluish color, which is one of the signs of probable pregnancy. The external generative organs are also much more developed and prominent, with an increase in the secretion of the sebaceous follicles and sweat glands of the labia. The joints of the pelvis and their cartilages are somewhat softened. The pelvic floor is increased from one to three and three-fourths inches at the end of pregnancy and the diameter of the outlet or distance from the front pelvic bone to the lower part of the spine is almost doubled, thus greatly facilitating delivery.

The abdominal walls show the enormous distention by more or less conspicuous lines, known as the *striae gravidarum*, which are found in over ninety per cent of pregnant women. They are bluish at first but gradually disappear after labor, leaving only a white scar-like appearance. These lines may also occur wherever there is great stretching of the skin from tumors or dropsy, and are due to displacement and partial rupture of the connective tissue of the deeper layers of the skin. They may also be seen on the buttocks, thighs and breasts. The navel is also affected by the abdominal contents, becoming less deep by the fifth month, effaced at the seventh and during the remaining months protuberant.

The breasts, too, undergo change in preparation for functional activity. There is an increase in all the tissues of these glands. They begin to enlarge as early as the second month, but not much until the middle of pregnancy. The nipples share in the increase, becoming enlarged, sensitive and more erectile.

A dark areola surrounds each, and after the third month the breasts contain a thin fluid called the colostrum, which can be pressed out.

The general changes of pregnancy depend upon the changes in the blood and in the functional modifications of the nervous system. The pregnant woman has to secure nourishment, breathe, secrete and excrete for two—herself and her fetus. If these are carried on in a fairly normal way health is maintained, but if these changes are developed in excess, disorders complicating the pregnancy are produced. The composition of the blood is altered as well as increased in quantity. Its watery elements, white corpuscles and fibrin are increased; its albumin and red corpuscles diminished. Poor hygiene and surroundings greatly reduce its quality. The growing fetus, developing uterus, changing pelvis and enlarging glands demand a large amount of material and necessarily drain the maternal system, especially at the close of pregnancy.

The heart is almost uniformly enlarged, being one-fifth more in weight in the pregnant stage, and disturbances of the circulatory system are of frequent occurrence. Palpitation of the heart in the early months is purely sympathetic, but in the later ones is due to interference from the enlarged uterus. Other blood changes may be so serious as to cause great swelling of the feet and legs, and even of the thighs. There is enlargement of the liver and spleen, the latter being due to its relation to the circulatory system; the thyroid gland is also increased in size.

The respiration is somewhat embarrassed in the later months by the upward pressure of the diaphragm because of the enlarged uterus, and since more blood must be supplied, the pregnant woman has more to purify, and eliminates more carbonic acid with the lungs. In the earlier months she may have a sympathetic nervous cough. To provide nutrition for herself and increasing organs, and the fetus and its appendages, she must digest more food and form more blood, hence must increase the activity of both secretory and excretory organs. Few women escape nausea and vomiting and the capricious appetite during the earlier months of pregnancy; but later the digestion and appetite improve, giving opportunity to improve the nutrition.

The pregnant woman gains in weight irrespective of the

increase from the uterus and fetus. The average increase is about fifteen pounds, which is uniform during the nine months notwithstanding the vomiting. This increase is stored up material to be used after delivery. The activity of the sebaceous glands, the sweat glands and hair follicles is also increased. Discolorations of the skin are numerous, being found upon the abdomen, the navel, the face and around the nipples. Owing to the drain by the fetus upon the elements of the blood there is delay in the union of broken bones.

The urine is more abundant and of lower specific gravity, probably because of the increased amount of blood. There are also changes in its quality and traces of albumen are often found. Albuminuria exists in many cases, more common in the latter than in the first half of pregnancy. It is aggravated by tight lacing and heavy skirts; also by diseases of the heart and lungs. So grave is the significance of albuminuria, the urine should be closely watched, particularly during the latter half of pregnancy. Proper treatment will relieve in the majority of cases and the disability may be entirely overcome. This belongs to the province of the physician to manage.

The mental condition depends much upon the nutrition. Women who are naturally cheerful may become irritable and depressed at this time and even melancholic or insane, while others feel exhilarated and energetic, both physically and mentally.

DIAGNOSIS OF PREGNANCY.

The first symptom in many women is nausea and vomiting. This comes in the morning upon assuming an upright position, or may come after breakfast. It may occur a few days after conception, but usually not until the fourth or fifth week, and generally ends at the fourth month when the uterus begins to rise out of the pelvis. The morning sickness is a sympathetic disorder reflected from the uterus, and aggravated by unpalatable food, sexual excitement or emotional disturbances. There may be cravings for indigestible food or substances. Excessive flow of saliva is a frequent accompaniment, which may last longer than the nausea and vomiting.

The second symptom is the stopping of the monthly sickness. This is so reliable that if to the date of the beginning of the last menstrual period 278 or 280 days be added, an approximate

estimate of the time of the coming delivery is obtained. The menstruation may not cease until the second month of pregnancy, but the preceding menstruation being much diminished in quantity would be a very good sign. So many things may cause stopping of the menses that this symptom, unless corroborated by other symptoms of pregnancy, cannot be considered positive.

Third. The breasts are in immediate sympathy with the reproductive organs and there is, with the constant increase in size, frequently a sensation of weight or of pricking, the veins become enlarged and more visible, the nipples enlarge and follicles are found in the areolæ. A secretion after the second month, upon pressure, is significant. Suppression of the milk in nursing women is a strong indication of another pregnancy.

Fourth. Disturbances of the bladder are common because of its diminished capacity, due to the increased size and settling down of the uterus, so that there is frequent urination; and inability to retain the urine may occur from coughing or sneezing when the bladder is distended.

Fifth. The intrapelvic signs. These are: (a) A softening of the neck of the uterus; (b) the dark blue color of the vulva and vaginal mucous membrane (but this may come from congestion due to vaginal or uterine disease); (c) Hegar's sign, an enlargement of the uterus in all directions; (d) the position of the uterus in the first and second months is lower, but in the third month it begins to rise and tip forward.

Sixth. Abdominal changes in size, shape and appearance. (a) During the first eight weeks there is some flattening of the abdomen, probably due to the descent of the uterus into the pelvis, dragging with it the bladder and depressing the navel. At the fourth month the uterus begins to rise for accommodation from the pelvic cavity, reaches the navel at six months, and touches the cartilage of the breastbone in eight and a half months. Later it begins to sink in the pelvis as the ligaments relax. These are changes that precede the coming delivery. The uterus is more symmetrical and contracts on being touched. There are changes in the color of the abdominal surface, markings due to stretching and brown lines. Fetal movement can generally be seen through the abdominal walls after the sixth month.

Seventh. Ballotment is the perception of the return of a solid body in a liquid when given a push from some external

source. The physician practices vaginal ballotment, but abdominal ballotment may be secured by pressing lightly some portion of the abdominal wall and at the same time giving an impulse by tapping from the opposite side. The abdomen must not be over-distended, the fetus must not be too large and there must be sufficient amniotic fluid to get this sign. It is obtained only in the fifth, sixth and seventh months, but when secured is an absolute sign of pregnancy, for no other condition presents a solid body floating in a liquid; but if not obtained it does not preclude the possibility of pregnancy, for many conditions prevent it from being distinctly felt.

Eighth. Intermittent contractions of the uterus, continually kept up independently of the will and perceptible to touch when the hand rests upon the enlarged uterus for a short time. Other conditions resemble this, even an overdistended bladder.

Ninth. Quickening felt by the mother as the result of fetal movements. These usually first occur about the middle of pregnancy, but are uncertain. When felt by the physician, as they often are by the sixth month, they are a very reliable sign. The patient may think that she feels movements when she does not, the sensation being due to gas in the intestines, or some other cause, giving rise to what is known as false pregnancy.

Tenth. Uterine sounds caused by movement of the mother's blood through the uterine blood vessels. It is heard after the fourth month, but is uncertain and varies in pitch, duration and location. Sounds may be heard when tumors are present.

Eleventh. The fetal heart sound cannot, as a rule, be heard earlier than the fifth month. Later it usually becomes quite distinct, but it may be feeble throughout the entire pregnancy. When the child is in the normal position this sound is best heard at a point on the left side of the abdomen, midway between the navel and the front spine of the hip bone. The average frequency of the pulsations of the fetal heart is 140 per minute. They may be less or more frequent, and the rate often varies temporarily. These sounds are heard earlier in a large fetus and, usually, earlier in males.

Twelfth. It is often possible to detect the size, shape and position of the fetus by abdominal touch.

Thirteenth. Mentally and emotionally women are somewhat changed during pregnancy. Usually they are irritable, fretful and changeable, though they may be buoyant and cheerful.

RELATIVE VALUE OF THE SIGNS OF PREGNANCY.

First. The presumptive evidences of pregnancy are menstrual suppression; morning sickness; irritable bladder; mental and emotional phenomena.

Second. The probable evidences are breast changes; bimanual signs; abdominal changes in shape, size and color; also changes in shape, size, color and consistency of the neck of the uterus; uterine murmurs and intermittent contractions.

Third. Positive signs of pregnancy are the active movements of the fetus; passive movements of the fetus; and fetal heart sounds.

MATERNAL IMPRESSIONS.

There is a widely prevalent belief that impressions received during pregnancy will in some way mark or deform the child, and many instances are cited, but, as a matter of fact, in very many of the cases to which reference is made, the impressions would have to have been received either before or after the time at which they did occur, to have been able to cause the conditions attributed to them. It has always been a great pleasure to me when questioned on this subject to assure my patients that if maternal impressions ever do in any way mar a child they are certainly rare exceptions.

What a deformed and distorted people we would be were each child as seriously affected as supposed, by every disagreeable shock received by the mother during pregnancy. At the same time it is wise to avoid undue emotions and unpleasant shocks and scenes, for they are sometimes the causes of miscarriage.

As there is little doubt that the mental and physical inheritance of the child is the sum of both parents' attainments, natural and acquired, good and bad, how necessary not only that the mother lead an ideal life during the nine months, the father heartily assisting her, but that all their former months should have been just as well spent, that the child to be shall have that highest advantage, a goodly heritage.

THE DURATION OF PREGNANCY.

The normal duration of pregnancy is nine calendar or about ten lunar months, or 270 to 280 days from the first day of the last recurring menstrual period. One of the best methods of comput-

ing the end of pregnancy is to determine the exact day on which the menstruation last appeared, count forward nine months or backward three months, and add seven days.

There are many exceptions and, even were the circumstances such that there was but a single coitus, there is a difference of time in different women, and in the same women at different times, between insemination and the fertilization of the ovum.

While it is not positively known for how long a time the ovum is capable of fertilization, experiments upon the lower animals have justified the opinion that it is as long as it remains in the oviduct, or about eight days. The spermatozoa show remarkable vitality even under less favorable circumstances and may retain their function up to three weeks after being deposited in the vagina. These facts render it impossible to fix with any certainty the beginning of pregnancy—that is to determine positively the moment of fecundation. The length of pregnancy often becomes a serious question, affecting the moral character of the mother and the legitimate and hereditary rights of the child. The records of many obstetricians show numerous cases of prolonged pregnancy. Since the development of certain portions of the body, as the teeth, are often delayed, we are forced to believe that gestation may be prolonged and delivery delayed.

THE HYGIENE AND MANAGEMENT OF PREGNANCY.

In order that the pregnant woman may be carried safely through this the most trying period of her life, attention must be given to diet, exercise, rest, sleep, clothing and bathing. To meet coming demands the breasts need preventive treatment. Early in pregnancy the desire for food is diminished and there is craving for unnatural food. A fair amount of nourishment must always be taken. It should be easily digested and so prepared as to make it palatable. Attention must be paid to desire for food as far as possible, and associations made congenial. In this way the morning sickness may be much lessened. In the fourth month the stomach irritability usually ceases and the appetite increases. All foods, animal and vegetable, that are reasonably well digested are suitable to her needs. The diet must still be simple, very nutritious, easily digested and taken at regular intervals. It should include a good supply of nitrogenous food, such as eggs, milk and easily digested meats, and vegetables and fruits. A good supply

of nutritious food improves the blood, increases functional activity, prevents emotional and nervous irritability, and promotes the healthy growth of the fetus.

No iron clad rules can be made as to just what any person should eat, but the pregnant woman must not eat a large amount of sweets and stimulants. Vegetables are good for her, but inferior to fruits. An abundance of water is a necessity. Milk, when it agrees, is a valuable addition to the diet, and sometimes is greatly needed. In cases of albuminuria, the milk diet, strictly enforced, will greatly lessen the danger of the complication known as eclampsia or the spasms of pregnancy. In the latter part of pregnancy the enlarged uterus so presses upon the stomach that the food must be taken in smaller quantities and more frequently.

If the intestines become torpid, such laxatives should be used as will produce a free movement without purging. Compound licorice powder in small doses or mineral water, such as hunyadi, or a laxative, as cascara sagrada, five grains, or twenty drops of the fluid extract, is useful. When the liver is inactive, one-fourth grain of calomel and soda tablets are advised, to be repeated every half hour until four doses have been taken, then followed two hours later by a saline laxative, as a tablespoonful of Epsom salts, a teaspoonful of phosphate of soda, or a Seidlitz powder. The prevention of constipation and toxemia requires such care of the skin as will promote its free action. Frequent bathing in tepid water, flannel, varying in weight according to the season and climate, worn next the skin, massage and gentle exercise, should not be neglected. The patient should have an abundance of fresh air, and, properly clothed, may be outdoors in all weather.

With few exceptions, all can take moderate exercise, but violent exercise and great fatigue should be avoided. There should be no riding over rough roads, or on horseback, or dancing or lifting heavy weights, and long journeys by land or water should not be taken. Without doubt women accustomed to active exercise, if no complications arise, have easier labors, but those not accustomed to it should not then take more than they can comfortably bear. For those who cannot take active exercise passive exercise is beneficial. Fresh air and sunlight should be obtained by riding in the open air. The pregnant woman should not live in crowded, ill-ventilated rooms. If there is much relaxation of the joints exercise may be objectionable; it always is when there are symptoms of miscarriage.

There must be plenty of sleep. A portion of each day, at least an hour or two after the midday meal, should be set aside for sleep or rest in the recumbent position.

The clothing should be so worn as not to compress the abdomen or chest and is best suspended from the shoulders. Corsets and tightly fitting skirts, by causing abnormal pressure upon the uterus and its contents, predispose to the complications of pregnancy, albuminuria and uremia. To women with relaxed abdominal walls a bandage which supports gives great relief. Every measure should be used to relieve pressure upon the renal and pelvic veins.

Bathing should be kept up as in health, once a day in warm weather, and twice a week in cold weather, using plenty of soap and water, the temperature of the bath to be that which is most agreeable. If the activity of the skin is impeded in the later months of pregnancy the functional activity should be stimulated by frequent baths. Vaginal injections are not needed unless there is much leucorrhea, in which case a saturated solution of boric acid should be used from the fountain syringe with gentle flow.

Sexual intercourse should be very carefully regulated, for it is often injurious to the pregnant woman, giving rise not only to much pelvic discomfort but being the primary cause of many abortions. This is especially true of the first and last months of pregnancy. If the neck of the uterus becomes diseased, requiring local treatment by the physician it may be safely given. Abortions are more likely to result from diseased conditions that have been neglected; and many nervous complications, nausea and even greater dangers can often be avoided, and the delivery made easier, by careful local treatment.

The mind should be pleasantly occupied, cheerful and agreeable associations provided, and plans of entertainment not neglected, since many of the former occupations are beyond reach. It is the time for the husband to intelligently co-operate with the wife.

For disorders of the stomach koumiss sometimes gives good results. It may be necessary to resort to rectal feeding. Nausea and vomiting can often be relieved or made bearable by judicious treatment. There are many preparations for this purpose but they should be taken only when prescribed by the physician in charge. The bowels should be moved at least once daily.

In constipation a teaspoonful of phosphate of soda in a cup of hot water before breakfast, or a Seidlitz powder, as needed, may be used; but cascara sagrada in five-grain tablets, or twenty drops of the fluid extract at bedtime, is a better remedy, in some cases.

It is of still greater importance to examine the urine at least once a month during the last half of the pregnancy, for indications are often thus obtained whereby spasms and uremia may either be avoided or modified.

The breasts need plenty of room for development. If the nipples are retracted they should be drawn out with the thumb and finger for a few minutes each day for the last six weeks. Daily washing with cold water is necessary. During the last month, to prevent sore nipples, bathe them in strong alum water, or a lotion made by adding a dram of tannic acid to a half ounce each of glycerin and water. Apply once every day.

As the pregnant woman is subject to all kinds of disorders and her enfeebled system is rich soil for disease, anything added to the burden of maternity may become a most serious menace both to herself and child, and as no two women are alike in pregnancy, and as no two pregnancies are alike in the same woman, the only safe way is to consult a good physician in case of ailments and complications.

CONDITION OF THE UTERUS AND ITS APPENDAGES.

The pregnant uterus naturally inclines to the right, and may sometimes so rotate as to seem almost twisted. Its great enlargement favors the increase of any tumors that may be within its tissues or closely connected therewith. If small they may not be discovered, or they may be the cause of early abortion, or give rise later to bad results. Cancer increases very rapidly during pregnancy and is a serious complication in labor.

Inflammation of the mucous membrane of the uterus is often a cause of abortion, and of hemorrhages or watery discharges should the pregnancy continue. This condition is usually a result of an inflammation which existed before conception. It may give rise to adhesion of the afterbirth, also to intermittent fever from blood poisoning. The treatment in such cases would be the emptying and cleansing of the uterus under antiseptic precautions by the physician in charge.

Inflammation of the oviducts often causes much pain during

pregnancy by reason of the exudation and adhesions which restrain the uterus from increasing easily and normally, and thus becomes a cause of abortion. It may give rise to general peritonitis and acute attacks of blood poisoning when labor occurs. A woman with this affection should avoid pregnancy. If it habitually exists a thorough course of treatment for recovery must be taken.

Diseases of the ovaries are generally made worse by pregnancy.

The disorders of the vulva occurring during pregnancy are usually due to injuries or constitutional disturbances, but are sometimes caused by lack of cleanliness, in which case local treatment should be applied.

Pruritis, or itching of the vulva, is one of the most disagreeable complications and, when not due to lack of cleanliness, is usually a result of digestive troubles or diabetes, though it may arise from some local cause. It is best treated by frequent baths followed by applications of soothing ointments, of which carbolic ointment and carbolized vaseline salve are good. The disorder may also require constitutional remedies.

Displacement of the uterus may cause great discomfort, complicating and even terminating pregnancy. Weakened uterine supports often follow frequent pregnancies and allow displacements to occur. The most frequent form is the retroverted uterus, that is, the body of the uterus is tipped back upon the rectum, causing a dragging sensation with a probability of impaction in the pelvis. Relief is obtained by lying upon the side or resting upon the chest and knees. When there are no adhesions and still no tendency to right itself, manipulation by the physician will often succeed. Sometimes it is necessary to retain the uterus in the proper position by wool pledgets, or a properly fitting pessary, until the fourth or fifth month, when the uterus rises above the pelvis and further danger from this source is removed. Cases of habitual abortion may be cured by thus raising the uterus.

When there are adhesions great care must be given to stretching them gradually by the use of cotton or wool tampons. It must be borne in mind that where adhesions exist there is also a possibility of inflammation that may give rise to blood poisoning.

The urethra, bladder and ureters have an increased blood supply during pregnancy and thus share in the disorders. The urethra may be closed in some portion by pressure of the displaced

uterus, and great distention of the bladder result with paralysis of its muscular layer and decomposition of the urine, followed by erosion, ulceration and, finally, perforation, unless relieved by the catheter.

COMPLICATIONS DURING PREGNANCY.

If inflammation of the bladder or bloody urine occurs during pregnancy, rest in bed is necessary. If there be gonorrheal inflammation of the urethra, careful treatment must be given, for when labor comes pressure upon the urethra may liberate germs that until that time had been quiet and an inflammation of the bladder follow which may extend to the ureters and kidneys, giving rise to acute inflammation of the kidneys. This process reaches its development only after several weeks, and the patient usually dies from blood poisoning.

The kidneys share with the other organs in the general congestion and enlargement at this time, and their diseases are aggravated by the pregnancy. This congestion is due to the tension to which all the organs within the abdominal cavity are now subjected, to disturbances in the nutrition of the kidneys because of the altered condition of the blood, and to engorgement of the ureters from mechanical pressure. Convulsions may occur without kidney trouble, but in most cases a diseased condition of the kidneys is easily shown. In acute kidney failure there is a great diminution in the amount of urea excreted and this means a quick fatality unless the condition can be remedied. The albuminuria of pregnancy is of very frequent occurrence and is not of serious import unless due to kidney inflammation—a matter which can be decided by a microscopical examination of the urine.

The treatment of the disorders of the urinary organs involves an examination of the position of the uterus with relation to the bladder and ureters, and correction of all displacements, also examination for inflammation of the bladder, which disease may be treated by a douche of some antiseptic solution. There is danger that after labor a case of chronic Bright's disease may set in.

Peritonitis during pregnancy is usually the result of previous inflammation, from germs or spores, of the mucous membrane of the uterus, of the oviducts, or of the connective tissue of the pelvis. A sudden exposure to cold or dampness, or a cold bath when the patient is overheated, may give rise to a fatal peritonitis. It may also be caused by mechanical injury or severe strain.

Concealed hemorrhage into the abdomen, or into the uterus, during the last months of pregnancy is of serious import. It is best recognized by the collapse and general condition of the patient. Treatment must be applied very quickly.

A relaxation of the pelvic ligaments often occurs, sometimes so great as to cause lameness and considerable pain. An abdominal bandage, having padded perineal bands, is the most successful treatment.

In the changes during pregnancy there is often formed and carried into the blood a toxic material which may endanger the life of mother and child. The principle form of this poison is an animal alkaloid known as a toxine. The symptoms produced by it are chiefly of a nervous variety. Several poisonous principles have been found in the urine. Poisons absorbed from the intestines are closely related to the toxines of pregnancy, and this is more likely to occur when, from displacement, the uterus presses upon the rectum. It has been noted that in such cases there is very little if any structural change in the kidneys. This trouble during pregnancy has been ascribed to the inactivity of the liver. The treatment is preventive by keeping the secretions up to the normal amount.

All compression of the pelvic organs should be avoided by wearing loose clothing suspended from the shoulders. The corset should be abandoned. Constriction of the blood vessels should also be avoided by guarding against constipation, and by wearing loose shoes and no garters that encircle the legs. To prevent constipation the patient must partake only moderately of heavy meats. Abundance of fruits, cooked or raw, and, if the digestion is good, whole wheat, graham and rye bread are proper.

Women may pass through pregnancy without serious trouble, but again may not, and as many grave complications may be avoided by the timely use of preventives, none can afford to be negligent. Vigilance is the price of safety, even though it cost much inconvenience. The amount of urine should be observed and if there be any decrease the physician should be notified.

The amount and character of the excretions and the condition of the nervous system are two things of great importance in the diagnosis of toxemia. Its treatment consists of prompt stimulation of all the excretory organs.

When threatened with toxemia the diet should consist of milk,

fruit and bread, or fish, oysters and gruel. Avoid meat, eggs, vegetables, pastries of all kinds and stimulants, including tea and coffee. The examination of the urine should note the quantity passed daily and the amount of urea. If there is inflammation of any importance the microscope will show granular casts.

Simple albuminuria is of little importance, but the circulation of poisonous materials in the blood of the mother calls for most urgent treatment.

DISORDERS OF THE NERVOUS SYSTEM.

Often the neuralgias are of great annoyance. They have their starting point in some disordered condition of the nervous system, or irritation from decayed teeth. If there is very much constipation and the fetus is large so as to press heavily on the pelvis, there may even be sciatic pain and obstinate cramps in the limbs, causing great distress. If caused by a misplaced uterus that should be remedied, and attention then be given the bowels, and the large bowel thoroughly flushed and emptied. Anemia and malaria are also causes of neuralgia; the relief of the former consists of building up the entire system; for the latter, antimalarial remedies are in order. Neuralgias come at irregular times, some at night, others in the morning or afternoon and attacks follow exposure to dampness and cold. If painful spots can be located, they may be painted with iodine or rendered insensible by an ether spray. The constitutional treatment consists of freely emptying the bowels that the system may be cleared of the poison of retained feces, that may be depressing the nervous system. Sometimes absolute rest in a warm room is necessary. Besides simple, easily digested food, tonics may be useful.

Derangement of the various secretory nerves during gestation is seen in what is called the salivation of pregnancy, and the excessive secretion of tears and perspiration in poorly nourished women. Herpes is another of the annoyances. It usually occurs about the fifth month and is apt to recur in succeeding pregnancies. Although an intense itching accompanies the eruption, the pregnancy is in no way affected by it, the general health remaining good. It may also come after labor. The treatment consists in regulating the bowels and other functions of the body.. The hypophosphites and iron are valuable in these cases. Local applications to be made are borated vaseline, or lime water and olive oil. When

the eruption has fully developed subnitrate of bismuth or powdered starch are soothing and useful. For the itching, carbolic acid in diluted solution, or menthol, is effective. When a large part of the body is involved, baths containing starch or bran are very grateful. Universal pruritis may materially interfere with the patient's general health.

Mania during pregnancy is seen in those women who are of a very nervous disposition, or who have inherited insanity. Alcoholism and hysteria predispose to it, and it may be caused by great mental shocks at this time.

Unhappy marriage is also an important factor in the causation of the insanity of pregnancy. Toxemia may also be a cause, as ascertained by examining the excretions. The prospect for recovery depends upon the cause and whether it is removable or not. If mania follows a severe shock and if the patient's general health is good, the outlook is encouraging; but if there is great physical disability, founded upon some diseased condition, the aspect is most serious. The treatment consists in the use of sedatives, complete seclusion from all company and a building up of the general health by every available means. When due to toxemia sedatives should not be given, but remedies used to promptly eliminate the poisons from the system.

THE NAUSEA AND VOMITING OF PREGNANCY.

The nausea and vomiting of pregnancy may be ascribed to some derangement of the uterus, such as malformation or displacement, or an injury to this or some other of the genital organs, sudden shock, disease affecting the blood, movements of the fetus, or violent peristalsis of the intestines. Distention of the bladder and rectum is frequently present. An inherited tendency to nervous irritability is often a predisposing cause.

The vomiting usually comes early in the morning, just as the patient lifts her head from the pillow, and is almost instantaneous. It may be repeated, and is without straining. After this the patient may take food and no more trouble occur until the next morning. The more severe cases begin in the morning and are not relieved by vomiting. The materials ejected are mucus, burning, bitter, and often sour. Although food may be taken and retained, the nausea may persist until late in the day, or longer. Distress of any kind, or certain articles of food, may increase it, and if the

vomiting is repeated there is likely to be straining and retching. After midday the patient is likely to be much better and able to eat a full meal.

In another class of cases the nausea is persistent, continuing through the waking hours. Various articles of food are craved but give no satisfaction. There is much vomiting and retching, with either dryness of the mouth and throat, or salivation. The vomit may first be mucus and food, then bile, and in more severe cases blood, then a coffee-grounds material. Food is no sooner taken than ejected; yet there are times of tolerance which give opportunity for some nourishment. Later in the case there is distress beneath the breast bone; emaciation is more or less rapid; a clammy sweat appears and there is great anemia. The signs of improvement are less vomiting and nausea, ability to retain food, natural excretions and considerable periods of sleep without vomiting.

It is hard to relieve cases of nausea and vomiting when the pregnant uterus is tipped back and bound down in the pelvis. This condition may be caused by persistently wearing tight clothing before and after the beginning of pregnancy, or it may be congenital. In order to properly treat this malady a thorough examination of all external causes, as well as a knowledge of the uterine condition, is necessary. When there is displacement, replace if possible. The uterus is often retained in proper position by tampons of wool inserted by the physician.

In serious cases of vomiting the treatment consists of putting the patient to bed, in the care of a competent attendant who will secure nourishment by supplying a variety of foods, and conserve the strength so much needed. The nourishment should be given by mouth if possible; if not, rectal feeding must be the next resort. The articles best given are beef in the form of peptonoids, peptonized beef juice, peptonized milk, champagne by stomach, and alcohol by rectum when necessary.

In case of chronic catarrh of the stomach the stomach may be washed out with salt and water, a teaspoonful to the quart, by means of a stomach tube. Solid food must not be given until there is considerable improvement; the patient's taste may be used as a guide. When only digestible articles are allowed, scraped raw beef, oysters, junket, milk with lime water and broths may be taken. A warm bath will often secure rest

and stimulants can be given by the rectum when necessary. Spontaneous cure of this trouble is no doubt due to a misplaced uterus righting itself by some change of position.

Bad conditions of the mouth and teeth often cause much distress. The gums may become very soft. The pain in the teeth is sometimes a reflex from the uterus. The treatment lies in proper attention to the general health. The decayed teeth should be filled with as little irritation to the patient as possible, or, if necessary, extracted rather than allow continued suffering.

The blood is frequently bad in ill-nourished women. The anemia of pregnancy should be treated by tonics and proper diet. Unless these women are built up in general health, alarming symptoms frequently develop as the pregnancy advances and the diseased conditions of the blood become more pronounced.

During the last months of pregnancy pressure upon the rectum predisposes to piles. They are relieved by hot compresses, or by an ice bag if more agreeable to the patient. Witch hazel on cotton and equal parts of belladonna and stramonium ointments are also efficient remedies.

INFECTIOUS DISEASES DURING PREGNANCY.

Pregnancy renders the patient peculiarly liable to the development of infectious germs, the excessive blood supply being favorable to their growth, so that complications of such a nature at this time assume very severe forms. Gonorrhea is frequent. When there is burning and difficulty in urination, with an irritant discharge, there should be an examination for this disease, although other causes exist for these symptoms. The attack is more virulent than in the nonpregnant, and the gonococci may not only infect the mucous membrane of the vagina, rectum and surrounding tissues, but also that of the uterus and the fetus itself. Children have been born with gonorrheal ophthalmia. The mother's entire genital tract may be affected, including ovaries and tubes. It does not always immediately show itself, but after labor may sometimes be the cause of death through virulent blood poisoning. In every locality of the body affected strong antiseptic measures must be adopted when it can be reached, or, in extremity, surgery employed.

Syphilitic infection may run the ordinary course or may become very malignant. Septic germs may be associated with

syphilis and give rise to blood poisoning after labor. Syphilis predisposes to abortion and in 75 per cent of the cases the fetus is lost. The disease is aggravated by pregnancy. To be efficient anti-syphilitic treatment should begin as soon as infection occurs.

The local treatment consists of cleanliness and the maintenance of local asepsis. Antiseptic douches should be used to cleanse the parts, and ulcers should be dusted with calomel and iodoform. All discharges of such patients must be received in absorbent cotton and burned. The constitutional treatment belongs to the physician to direct. In addition it is of great importance that a liberal diet with stimulating tonics be persistently taken. Since the condition of the pregnant woman renders her so liable to contract contagious and infectious diseases, she should not be exposed to scarlet fever, measles, diphtheria, erysipelas, small-pox, varioloid, cholera or whooping cough, or live in rooms where a consumptive is confined. The danger is especially great when exposure to any contagion or infection occurs either during labor or in the lying-in period.

CHAPTER III.

ABORTION.

The term abortion is generally applied to the termination of pregnancy, by the expulsion of the ovum, before the expiration of twenty-eight weeks; expulsion of the fetus after that, and until a short time before full term, being called premature delivery or miscarriage. Abortion occurs most frequently in the first three months of pregnancy, when the ovum is usually expelled intact; the greater liability at this time being due to the greater vascularity of the uterine mucous membrane, the feeble attachment of fetal membranes, and, in the third month, to the change from the complete attachment of the ovum to the uterus to the partial attachment at the site of the placenta. Later the placental attachment becomes stronger and the uterus adjusts itself to the new order of things.

Abortion is caused by fetal death or uterine contractions, and may be referable to the father, mother or fetus. Exciting causes, when combined with predisposing causes, act more directly upon the ovum. They are violent coitus, blows, falls, contusions, jars of railroad traveling, long rides, rapid stair climbing, lifting heavy weights, running a sewing machine, sea bathing, stretching the arms above the head, missteps, etc. Many of the predisposing causes become effective only when joined with some exciting cause. It is impossible to predict in any case that an abortion will occur under certain circumstances, for often a very slight cause is sufficient, then again most serious accidents have occurred and the pregnancy remained undisturbed.

The paternal causes of abortion are syphilis, extreme youth or old age, debauchery and feebleness. The maternal causes are syphilis, tuberculosis, infectious diseases, disorders of the kidneys, lungs, liver and heart, excess of carbonic acid, convulsive diseases, excessive vomiting or coughing, chronic lead poisoning, great physical exertion, fright, anxiety and other emotional excitement. The habit of abortion is probably due to a continu-

ance of the conditions which first led to it, and the prospects of escape from it in future pregnancies depend upon the probability of relief from these conditions.

Local causes are chronic or acute inflammations of the uterus and its appendages, tumors, adhesions and displacement. Retroflexion and endometritis are especially liable to give rise to uterine contractions. Attachment of the uterus to other organs, a contracted pelvis and tight lacing may cause fetal death by preventing the development of the uterus. Surgical operations upon distant parts have caused abortion; again very serious operations have been performed upon the pelvic organs without causing any trouble, but in such cases there is always danger.

The fetal causes of abortion are any abnormal condition of the ovum or its appendages, which may produce death of the fetus; as inflammation of the membranes, syphilis, placental apoplexy, abnormal positions of the placenta, especially when near the mouth of the uterus, too short a cord and knotting of the cord.

The death of the fetus may be caused by disease transmitted by the mother, such as syphilis, small-pox and other infectious diseases. The symptoms indicating abortion are seldom to be depended upon before the third month of pregnancy and cannot always be relied upon after that time.

Some of the signs are shifting pains in the back and abdomen, frequent urination, nausea and vomiting, and if with these there be a watery discharge from the uterus the probability of an abortion should be considered and preventive treatment commenced. An abortion is generally slower than a normal labor. Its duration depends upon the cause, the conditions present and the frequency and energy of the contractions of the uterus. If caused by a shock or severe fall an abortion may be almost instantaneous, or after a few gushes of blood, but this is not the rule.

In early abortion hemorrhage is usually the first symptom. It is often excessive and may be sufficient to cause the death of the mother. It may precede pain for hours, days or even weeks; or it may be accompanied by pain, but rarely so in the beginning. The hemorrhage may be slight at first and increase or decrease, or stop entirely, to begin again upon some excitation. The blood may ooze continually from the uterine surface and collect in considerable quantities to be expelled in clots. The amount of blood

lost varies with the time in the pregnancy, being less near its completion, also with the extent of injured surface caused by the separation of the ovum from the uterine walls. The bleeding usually continues until the uterus is emptied.

The pains of abortion resemble labor pains, and vary according to the existing conditions. In rare cases pain may precede the hemorrhage and is then likely to be harder to bear than the usual labor pains.

In the expulsion of the uterine contents, instead of the placenta and membranes being expelled with the fetus, a portion or all of the placenta or membranes may remain in the uterus and there be considerable delay, even days, weeks or months, before all is expelled. As long as any portion of the ovum or membranes remain in the uterus the patient is liable to hemorrhage and blood poisoning. When abortion has taken place, and is supposed by the patient to have been completed, it is very essential that all fragments of tissue and the ovum, or supposed ovum, be saved for inspection by the family physician, since positive diagnosis from their examination will enable her to avert future risks and to determine upon the best modes of procedure.

A threatened abortion may be averted by proper measures, the first of which is absolute rest in bed, even in the mildest cases, and the next the care of the physician. During pregnancy even a slight show of blood requires this quiet rest in bed, as almost invariably matters go from bad to worse and, since in this condition, the life, both of mother and child, is at stake, no woman should take any risks. For the child, in the earlier months, death is certain, while to the mother a badly managed case of abortion, with the resultant pernicious consequences, is not nearly as amenable to treatment as the same condition after labor at full term. There may be anemia with great debility after severe hemorrhage at the time of the abortion, or recurring hemorrhages may result from the failure of the uterus to return to its normal size, or from retained fetal membranes.

Some of the common local results of abortion are inflammatory diseases of the uterus, ovaries, tubes and adjacent structures, which may lead to abscesses. If some of the membrane or placenta be left, moles or tumors of the uterus may be formed; or there may be secondary infection, resulting in abscesses in the joints or any other part of the body. Abortion is disastrous also

to the nervous system, the irritation often being due to reflex manifestations arising from local conditions, or to self-infection from a continuous absorption of slightly poisonous materials from a chronically inflamed mucous membrane.

The preventive treatment in abortion consists of making the patient as nearly perfect physically as possible, and from the beginning of pregnancy carefully avoiding exciting causes. Local causes, such as tumors, uterine inflammations and displacement, should be treated and cured before conception, and general diseases, as tuberculosis, syphilis, anemia and nervous troubles, as well as chest and abdominal affections, remedied as far as possible.

Syphilis is responsible for a greater number of abortions than any other one disease. If present in one or both parents it should receive prompt and thorough treatment, and during pregnancy the greatest care should be taken to avoid all possible sources of irritation, as fatiguing work, lifting, riding, dancing, too long walks, stair-climbing, reaching, jumping, sea-bathing, corsets, tight clothes, contagious diseases, overheated or poorly ventilated rooms, crowded theaters or congregations, emotional excitement, late hours, etc. The diet should be carefully selected that acute indigestion, gas, nausea, colic, diarrhea and constipation may be avoided. The kidneys should be properly regulated, and coitus prohibited. At the time corresponding to the menstrual period the patient should spend several days in bed. In cases of repeated abortion it is wise to take from six months to a year for treatment of causative conditions before entering upon another pregnancy. In a few cases confinement to the bed, practically during the whole pregnancy, seems the only way of prolonging it to full term.

In the beginning of an abortion, if the pains are not too hard or the hemorrhages too severe, there is hope, with quiet and rest, of preventing a further separation of the ovum from the uterus. The patient should be put to bed in the most quiet, best ventilated room in the house, and should remain in a recumbent position for several days, not rising even to a sitting position for any purpose, a bed-pan being used for defecation and urination.

There should be no talking, or visitors, or worry of any kind. A free movement of the bowels must be secured each day by a mild laxative or rectal injection. The clothing must be cool and light, and the diet nutritious and easily digested, but not stimulating. All drugs and local treatment should be administered under the direction of a physician.

In the after management of abortion there should be given as much time for the repair of uterine lesion, and for the return of the uterus approximately to its former size, as in delivery at full term, and, owing to the imperfect development of the uterus at the time of abortion, even a longer period is often required for restoration. The treatment is quiet rest in bed, and such medicines and local applications as may be needed.

The province of this book is to point out the dangers and show how to avoid them, and, since to be forewarned is to be forearmed and prevention is better than cure, the value of its counsel cannot be overestimated. Many times, too, it is able to name the remedies that will aid in the restoration to health; but so many combinations of complications occur in abortion as to make each patient a law unto herself, and it is only upon careful diagnosis by a skillful physician that treatment can be minutely prescribed; however, it is safe to say there would be a great decrease in the number of pelvic disorders, and in the number of abortions as well, were women always treated after abortion as after normal labor.

The fetus may die and remain in the uterus for weeks and months. This is called missed abortion. The symptoms of pregnancy then cease, the waters are absorbed, the abdomen becomes smaller and milk appears in the breasts. The child in the uterus, with the placenta and membranes, may become macerated or mummified. It may not become putrid if the membranes are unbroken, for the air with its load of poisonous germs cannot then gain access, but when air does find an entrance suppuration with its attendant ills soon follows. A dead fetus in the uterus, even if it does not suppurate, impairs the general health and is always a source of danger, hence, after waiting a reasonable time, should be removed.

EXTRAUTERINE PREGNANCY.

Extrauterine pregnancy is the name given to a pregnancy occurring outside of the uterus, and although of sufficient importance and interest to require mention here, let no woman, because of having read this chapter, be frightened into believing that every strange sensation which she may hereafter experience is due to such a pregnancy, for the condition is rare. When it does occur, it may be either tubal, ovarian or abdominal.

The tubal pregnancy is the most frequent, and the abdominal form is probably due to a rupture of the tubal variety. The development of an ovum within a Fallopian tube is like that within the uterus, except that the tube, not being fitted for continuous enlargement, sooner or later ruptures beneath the broad ligament or into the abdominal cavity, at which time there is great danger of excessive internal hemorrhage with collapse and sudden death. The primary cause of extrauterine pregnancy is inflammation of the Fallopian tubes, following uterine inflammations. The time of the rupture depends upon the location. It usually comes from the second to the fourteenth week and, if there be no accident at the time of the first rupture, a second one may occur at any time up to full term.

If, at the end of the second month of extrauterine pregnancy, the death of the fetus occurs it may be entirely absorbed; if after that time, it either undergoes mummification, or calcification, or is converted into ammoniacal fat, or is decomposed. The mummified fetus resembles an Egyptian mummy, and may turn into stone, and remain indefinitely in the abdomen without causing discomfort. In case of rupture of the sac, so that air gains admittance from the intestinal canal or other source, decomposition sets in and an abscess may empty into the rectum, bladder or vagina, or even burst through the abdominal walls and with the pus discharge the fetal bones. Should the fetus live until full term it could be delivered only by an opening through the abdominal walls. It is often feeble and after the delivery is not likely to live.

The treatment usually consists in removal of the fetus by an abdominal operation in order to save the mother's life, and this must often be done hastily to prevent death from hemorrhage—a crisis that may occur at any time during the pregnancy.

The symptoms of an extrauterine pregnancy may not differ from those of a natural one, although at times the patient may be entirely unconscious of her condition. The breast changes, the disturbances of the stomach and pain in the affected side, with absence of menstruation, are the most frequent signs. There may, however, be an increase of menstrual flow with discharge of small pieces of membrane. Pain may be almost constant, or entirely absent and the patient may or may not consider herself pregnant. If a vaginal examination is made before rupture the Fallopian tube on that side will be found enlarged and, if the pregnancy is

much advanced, the uterus will be pushed to one side. There may be pressure symptoms, but any tumor would cause such a disturbance.

The symptoms of rupture are very marked. The patient, usually well, or the subject either of but slight discomforts or of those attending pregnancy, is suddenly seized with severe abdominal pain. The attack may come after only slight exertion, or even when the patient is asleep in bed. If the hemorrhage is extensive extreme collapse and unconsciousness occur. If the rupture is into the broad ligament the hemorrhage may cease, to recur later. The pulse, at first rapid, becomes weak and imperceptible; the breathing quickened and jerky. This condition terminates in profound shock and, if the bleeding be not soon stopped, in death. The case calls for a rapid, skillful surgical operation.

If the tube ruptures early into the broad ligament, and the fetus dies, there is usually no further trouble. Sometimes, in case of slight hemorrhage, with the first rupture, the fetus continues to grow until full term, provided a second hemorrhage does not result disastrously, when there is an attempt at labor pains and feeble contractions. Prominent symptoms of pregnancy are always present in the later months and at full term the fetus soon dies, after which the fluids are absorbed, the abdomen lessens in size and the fetus, as before explained, may remain intact, resembling a tumor, or change into a mummy or stone. There is danger of decomposition and blood poisoning for months and years after the death of the fetus, unless mummification or petrification does take place. These cases are very rare and when they do occur it is usually after several children have been born, and there has been a long interval following the last birth, or after an attack of pelvic inflammation.

A tumor or an enlarged uterus tipped backward sometimes resembles an early pregnancy, both in size and symptoms, and unless life is in danger from inflammation or blood poisoning, the plan of waiting until positive signs of pregnancy appear is always in order.

DISEASES OF THE FETUS.

The fetus during its life in the uterus is protected from injury and disease by the bony pelvis, uterine walls and the bag of waters; but on the other hand is subject to the diseases of the mother and

father, nervous disturbances, high temperature, bad nutrition, diseases of the uterus and its appendages, and infectious diseases, all of which exert their influence upon its growth and development and may cause its death before birth.

Certain tendencies to disease are inherited, such as unnatural conditions of the nervous system and lack of nutrition, drunkenness, epilepsy, diabetes, consumption and cancer of either parent, and act unfavorably upon the development of the child and may cause its death in the uterus.

If the mother suffers from an infectious disease, the fetus will be affected, either indirectly from an impaired nutrition, or from a direct transmission of the disease itself. In either case the pregnancy may be interrupted, or the child may die soon after birth.

Infections of the mother do not all appear to be equally severe. La grippe, cholera, diphtheria, typhoid and serious cases of malarial fever are usually attended by miscarriage or premature delivery, in many of which cases the fetus first dies of the disease, transmitted by the mother. The eruptive fevers are especially likely to affect the child before birth and to cause miscarriage. There are a good many instances of children being born with scarlet fever and measles.

In about fifty per cent of the cases of pregnancy, complicated by small-pox, abortion occurs. Erysipelas usually interrupts pregnancy. When the mother has consumption the child is generally puny, feeble and predisposed to lung trouble.

The most fatal disease which affects the child in the uterus is syphilis. It may be transmitted by either parent. If the mother becomes infected during the last month of pregnancy the child may escape, unless infected at birth or while nursing. The earlier in the pregnancy the mother is affected the more likely is the fetus to die. In the untreated cases in which the infection occurs during the first three months the fetal mortality within the first few days after delivery is 100 per cent. The chances are little better if the infection occurs during the fourth and fifth months. As a rule infection of the mother is safer for the fetus than infection of the father. All modern authorities assert their belief that syphilis may be transmitted to the ovum through the spermatozoa without infecting the mother.

The infection of the child may be taken for granted if either

parent acquired syphilis shortly before or after conception. The more recently the father has suffered from the disease the more likely is he to transmit it in a severe form. Often the child is prematurely born, with traces of the disease. In other cases it is apparently healthy at birth, but symptoms of the disease appear in from two to six weeks. There is usually marked general debility. Among the first symptoms of hereditary syphilis is snuffles. This is followed by a rash with red patches about the genitals, thighs and forehead. The upper lip is likely to be sore and cracked, and there may be inflammation and even ulceration of the mucous membrane of the throat, giving rise to hoarseness. The nasal catarrh may result in loss of the nasal bones. The child is likely to suffer from broncho-pneumonia. The liver is much increased in size and may be filled with hard nodules or spots of inflammation. These children are also subject to severe hemorrhage under the skin, in the internal organs and from the navel. Tenderness and swelling of the long bones is also symptomatic.

The treatment of fetal syphilis is mainly in the use of preventives. The parents may eradicate the disease by long-continued treatment. The child is greatly benefited by treatment of the mother during the pregnancy, and, if it be continued faithfully throughout the entire term, there is a possibility of immunity for the child, otherwise its chances will be very slight. Mercury and iodide of potassium are the most reliable remedies.

MANAGEMENT OF THE FETUS.

To properly manage delivery at full term it is necessary to study the health and habits of the patient during pregnancy and to know the history of previous labors; thus it is better that the pregnant woman should be under the care of the physician from the earliest days of gestation, especially if it be her first. In the last month an examination should be made to ascertain the position and presentation of the fetus and whether any complications exist, also to learn the relative size of the pelvis of the mother and the head of the child.

It is usually possible, by external examination of the abdomen, to determine the position of the child, whether its back is on the right or left side of the abdomen, or if, as sometimes happens, when the abdominal walls are much relaxed, it is lying across the abdomen with its back toward either the front or back of the

mother. Often the physician, with her hands, can move the extremities, which appear to the touch as small nodules and when found serve to show the position of the back. The fetus lies doubled up, the chin and arms upon the chest and the legs upon the abdomen. In the normal position the head is down, for it is the heaviest portion of a body floating in water, and the back is to the mother's left side. If this relation be still maintained when labor comes, the largest diameter of the child's head will correspond with the largest diameter of the mother's pelvis and thus facilitate an easy delivery. The next most frequent position is with the back to the right side of the mother's abdomen, the largest diameter of the head corresponding to a diameter of the pelvis, which is a little less than that in the former case and therefore causing a longer labor. Less frequently there are other positions of the head, and, as they have to be changed into either the first or second position, they result in much delayed deliveries.

Then, too, the breech or feet may come first, with the same relations of the back of the child to the sides of the mother. These are usually longer deliveries and more dangerous to the life of the child, for, as its head, the largest portion, comes last, it must be delivered quickly in spite of the lack of dilatation of the external outlet, for when the body comes in contact with the cooler external air the child begins to breathe and thus draws water into the lungs, just as a drowning person does, and in a few minutes is beyond recovery. The shoulders or side of the child sometimes presents first, but in such a case there is no possibility of delivery unless the fetus is very small and imperfect, and even then it is better if changed by manipulation into one of the other forms. A vaginal examination serves to confirm the external diagnosis of presentation and position, and often is the only way of reaching a positive conclusion. The diameters of the pelvis are determined by measurements with an instrument called a pelvimeter.

Normal labor is the separation of the fetal and uterine membranes, accompanied by contractions of the uterine muscle and expulsion of the fetus at full term. These contractions are called pains because of the pain associated with them, due to the pressure on the uterine nerves during a contraction, to the stretching of the ligaments and the neck of the uterus, which is sometimes resistant, and to pressure upon neighboring organs.

The susceptibility to pain varies in different individuals. The

very young mother and the woman who bears her first child late in life usually suffer most. A painless labor is very rare. I have attended just one—a Polish woman of twenty-five in her second delivery. The contractions were quite as forcible as in any normal labor, but she persistently insisted that she felt no pain.

At first the pain is in the back and sacrum, later in the abdomen or down the thighs. The most severe pain is when the head passes the external pelvic outlet. Signs of beginning labor usually occur about two weeks before delivery. There is a sinking of the fetus into the pelvis, thus allowing more breathing space, and the patient feels and eats better. This may be followed by irritability of the bladder and pressure upon the pelvic organs, and there may be intermittent pains. Other signs are a show of mucus streaked with blood, not constant, and increased vaginal secretions, but the most positive sign is regularly recurring pains, increasing in force with lessening intervals between. This is the period of dilatation of the mouth of the uterus and adjustment of the head of the child to the pelvic canal of the mother. The length of this time varies with the size of the mother's pelvis, the size of the child's head, the flexibility of the mother's joints and tissues, and the compressibility of the head or presenting part of the child. It is usually shorter when the head comes first.

The pains at the beginning are half an hour apart and give but little discomfort, but they gradually come nearer and nearer together until there are but short intermissions. The average duration of the first stage in first labors is fifteen hours, and in other labors eight hours, but in the first labors of women about forty years of age it is over thirty hours, and it has been known to last several days. The second or expulsive stage lasts from ten minutes to six hours, its average in first labors being two hours, and in others one hour. The pains are now bearing down, tearing and hard, the result of nature's effort to drive down the fetus regardless of injury to tissues. This is the time of the greatest suffering, but it is usually better borne than the longer, nagging pains of the first stage.

The third is the placental stage, that in which the membranes and placenta become separated from the uterus and expelled, and the uterus contracts. There is loss of blood, but usually it is not excessive. This stage generally lasts from twenty to thirty minutes, but may continue two hours, or longer, if the placenta or

membranes adhere to the uterus, in which case they must be removed by the physician. This is usually done within half an hour.

ANTISEPTIC PRECAUTIONS.

During the last twenty-five years the discovery and use of antiseptics and the knowledge of asepsis has revolutionized the art of surgery and obstetrics, so that the danger of child-bed fevers, where proper and intelligent care has been taken, is now practically nothing.

PREPARATION OF THE ROOM.

The room in which the patient is to be confined should be well ventilated and sunny, and should contain only the furniture actually needed for comfort, as a bed, table, one or two chairs, a small bed for the baby, some provision for heating, plain, clean walls, clean, bare floor, with one or two rugs, and plain window shades, to moderate the light. All food and articles required for a change should, if possible, be kept in an adjoining room and be brought in as needed. As a means of heating, a stove in the room answers every purpose, aiding, too, in securing a good circulation of air, and convenient for disposing of soiled dressings which, if not burned, may be allowed to accumulate and become a breeding place for germs. The air should be as pure as possible and prevented, by the evaporation of water, from becoming too dry. The water closet must never communicate directly with the lying-in room; must always be ventilated from the outside, and its door should close automatically.

PREPARATION OF THE BED.

The bed should be made up with an absolutely clean mattress, fresh blankets and sheets, and padding that has been prepared by boiling, or subjection in an oven for an hour to a heat of 300 degrees; over the bed is the rubber or oilcloth that has been carefully cleaned by sponging with a solution of bichloride of mercury, one part of the bichloride to one thousand parts of water, and over this a second clean sheet and padding prepared like the first.

PREPARATION OF THE PATIENT.

As soon as labor is certainly in progress the patient should be given a full bath in warm water, be scrubbed thoroughly with

soap, have the bowels moved by an enema, the external genitals, anus and neighboring parts washed with an antiseptic, be given an antiseptic vaginal injection and dressed in clean clothes. For the vaginal injection a solution of corrosive sublimate (bichloride of mercury), one part of the sublimate to five thousand parts of water (three grains to the quart) is effective, but as it is very poisonous care must be taken not to leave any of the solution where someone might drink it, and it must not be put into the rectum, neither must the tablets, often used for making this solution, be left where children may handle or eat them.

OTHER SAFETY MEASURES.

All instruments to be used should be boiled for thirty minutes before using and be touched only by hands that have been thoroughly disinfected. If a catheter is used it may, after the disinfection, be oiled with sterilized vaseline and should be introduced by sight. No irritating antiseptic must be allowed to remain upon the instrument lest it cause inflammation. All water used about the patient or upon the hands of the attendants must have been recently and thoroughly boiled, and all towels, pads, absorbents, bandages, articles of clothing and other things used at this time, and during the lying-in, must be carefully disinfected.

The hands of the patient, nurse and physician should also be disinfected. To do this, first scrape and clean the nails while dry, then scrub the hands and forearms for not less than ten minutes in strong soap and water as hot as can be borne, after which soak them three minutes in an antiseptic solution. That formed of one part of corrosive sublimate to one thousand parts of water is good.

The nurse should have in readiness a table with basins of the antiseptic solution, plenty of clean towels, sterilized vaseline, good soap, absorbent cotton, a saturated solution of boric acid crystals for the eyes and powdered boric acid for the cord, one or two pieces of unbleached muslin a half yard wide by one and a fourth long for abdominal bandages, a fountain syringe, safety pins, an extra rubber sheet, a blanket for the child, and the child's clothing, and see that there is plenty of previously boiled, and hot water obtainable at all times.

THE CARE OF THE CHILD.

Immediately after birth clear the child's air passages of mucus, using the finger if necessary, and sever the navel cord when it stops pulsating; or before if any complication arises. Tie the cord twice, with narrow tape, about one inch and a half and two inches and a half from the body, and cut midway between these ligatures. The newborn must be protected against sudden chilling. A change of 30 degrees is usually fraught with danger. Wrap the child in a warm woolen blanket and immediately wash its eyes in warm water, containing all the boric acid crystals that it will dissolve, taking great care to get out all the maternal secretions, then cover it, head and all, in the blanket and lay it in a warm place until the mother can receive attention. As soon as she has been cared for, the nurse should cleanse the baby by anointing it with sweet oil, vaseline or even fresh lard; then, if it be strong and healthy, by sponging it with warm water and a little non-irritating fluid soap; but if the child is weak and feeble it should be cleansed with the oil or vaseline only, and kept a few days in warm flannels or cotton. The room must be well ventilated and of a warm and uniform temperature, and a bath of water or oil given daily. Oil should always be used as a preliminary just before the first water bath.

After the first bath, the best time for bathing is in the morning midway between the feedings. After the stump falls off, daily sponging may be superseded by daily immersions in warm water. If any powder is needed for irritation between the folds of the skin, equal parts of lycopodium and oxide of zinc form a good one.

There is no occasion for worry if the child does not pass urine for several hours, for it will not secrete much until it begins to nurse. In six or eight hours, when the mother has become well rested, it should be put to the breast, not only for nourishment and training to good habits, but for the tonic effect upon the uterus of the mother. The nipples are to be washed, both before and after nursing. Well-fed babies usually eat, sleep, grow and give little trouble, and rarely take contagious or infectious diseases; but the poorly nourished are nervous and irritable, fit subjects for all the prevalent ills.

THE CARE OF THE MOTHER.

After the expulsion of the placenta the patient should be washed again and the vulva thoroughly cleansed. The use of a vaginal injection at this time depends upon the termination of the case and whether or not there is a necessity for it. If used the syringe nozzle must first have been boiled, or disinfected by soaking in the corrosive sublimate solution, then rinsed well in boiled water. The dressing consists of an occlusion bandage fastened tightly to the abdominal bandage.

For the first few hours after labor the best position is upon the back, for if turned upon the side the heavy uterus falls forward and may draw air into the passages, exposing the patient to the risks of embolism. After the uterus has become firmly contracted there is no more danger in this direction and the patient may occupy any position she pleases while lying down. A sound sleep for several hours following labor is very favorable, and an important element in the restoration of the patient, hence an opportunity for rest and sleep should be given as soon as mother and child have received proper attention. Have the room quiet and the light subdued. The child should not be allowed to disturb the mother's rest, hence must not be placed in the same bed and, if it cries, should be taken to another room. If after pains keep her awake a sedative is given according to the direction of the physician.

Great care should be taken to keep clean the external genitals of the patient, her own linen and the bed clothing. The vulvar dressing should be changed every three or four hours for the first four or five days, and as often thereafter as soiled. Whenever it is changed the external genitals should be thoroughly cleansed with soap and water, followed by some antiseptic solution. This is best applied with the fountain syringe, the water being caught in the bed-pan. The patient ought to be sponged frequently with tepid water, or alcohol and water, because of the great activity of the skin; and a warm glow should be produced by friction with a towel. The draw sheet, a common sheet folded to four thicknesses and placed beneath the hips, can be easily removed whenever soiled.

The air must be very pure, and fresh air should be admitted constantly from the outside through open windows, care being used to avoid draughts. The room must not be too dark, but the

infant's eyes must be protected from strong light until two or three weeks old.

Urine should be passed in from six to eight hours after labor, and if all other means fail, the catheter must be used, the utmost care being taken to preserve absolute asepsis. Boiling in water for thirty minutes makes the catheter safe. The parts are to be washed in soap and sterilized water, and bathed with an antiseptic solution, then the catheter, oiled with vaseline sterilized by heat, should be passed by sight.

The bowels ought to be moved in about thirty-six hours by some mild laxative, as a Seidlitz powder, or by a rectal injection of soap and water, a small injection of sweet oil, or a half pint of glycerin solution of one-fourth strength.

DIET.

The diet of the mother should be restricted for the first twenty-four hours to liquids. Food will not be tolerated after anesthetics until their effects have worn off. On the second day soft boiled eggs and semi-solid food may be taken, and thereafter a moderately full diet is permitted. The patient needs as liberal diet as she can digest, both for her own nutrition and that of her child, for she should nurse her babe not only for its welfare, but for her own good, unless some complication arises that makes it undesirable.

NURSING.

The child is put to the breast after six or eight hours, and not oftener than once in four hours thereafter, until the secretion of milk is well established, after which the baby should be nursed once in two hours by day and every three or four hours by night for the first five months. If the intervals are too long, the milk becomes too thin; if too short, it becomes too rich; and if of irregular length the child's stomach is upset.

If the breasts become overdistended they can be relieved by massage, by saline cathartics, by drinking less, or by wearing a compression bandage (a straight piece of cloth, cut out under the arms and for the neck, and pinned tightly around the body across the breasts), with circular openings for the nipples.

If the nipples are small much trouble will be saved by putting the infant to the breasts before they become engorged. A little patience and perseverance will usually succeed, even if it does

not take hold well at first. As the child usually falls asleep after nursing, it is well to establish a regularity of feeding by waking it at the proper time. Regurgitation generally means an overfilled stomach. For the first two or three days a baby gets but little nourishment from nursing and needs but little.

If it seems hungry it may be pacified by a teaspoonful of warm water, or cows' milk, one volume of milk to two of water. Give up to one ounce at a feeding. From ten to twenty minutes is enough for each nursing, and it is better to apply the child to both breasts each time, unless some complication intervenes. It is well to weigh the child once a week, for an increase in weight is a proof of good health. If it does not continuously gain, at least five ounces a week for the first five months, the reason must be sought in the surroundings, or lack of nourishment or warmth. If, as often happens in weak women, the milk is deficient, the infant's lack of nourishment is soon evident, and something must be done to improve the quality and quantity of the breast milk, or artificial food be drawn upon to supply the deficiency.

ARTIFICIAL FEEDING.

When the baby must be artificially fed, cows' milk is best, modified to approximate human milk, then further modified by experiment to suit the individual child. Mixed milk from a herd is more likely to be uniform in quality than the milk of one cow, and less likely to spread disease. The following Meigs-Rotch mixture is one of the best:

Cows' milk, mixed herd.....	two ounces
Cream.....	three ounces
Water, boiled.....	ten ounces
Sugar of milk.....	three-fourths of an ounce
Lime water.....	one ounce

Whenever indicated by the condition of the child these proportions should be changed to meet the emergency. The capacity of a child's stomach is about one ounce at birth and increases at the average rate of one and a half drams a week for the first six months. This, of course, is only a general average.

The milk should be given at a temperature of 100 degrees. Milk may be completely sterilized by long boiling, but this destroys some of its chemical constituents and makes it indigestible. A partial sterilization at 167 degrees has been found to render milk

practically sterile for twenty-four hours, without impairing its qualities. If a wet nurse is to be obtained the selection depends upon her health and age, and the age of her own child, which should be near that of the foster child. She must be free from syphilis, tuberculosis and all other contagious and infectious diseases. In the majority of cases good cows' milk properly modified is preferable to the wet nurse.

Since cows' milk, modified according to the needs of each case, furnishes the most perfect food for infants deprived of the mother's milk, the artificial foods with which the markets are flooded should be avoided, except in some cases of intestinal troubles, when a substitution for a week or two affords a change of diet and sufficient nourishment. A child will often grow fat while taking them as permanent food, but, as they contain a greater proportion of sugar and starch than of albumen, they promote the formation of fat cells rather than the growth of muscular and organic tissues, thus entailing a diminished power of resistance to disease, with all its disastrous results.

Condensed milk, when diluted to give a proper proportion of albumen, is deficient in fats, and, in the unsweetened brands, in sugar also. If the sweetened brands contain cane sugar they promote acid fermentation. Cane sugar is not an ingredient of milk and should never be used as a substitute for milk sugar. A condensed milk, whose proportions are known, can be used as a base upon which to construct a suitable food by the addition of the necessary ingredients.

THE CHILD'S CLOTHING.

It should be loose and easily changed. The belly band, used to retain the navel dressings, is removed as soon as the cord is healed, and, while worn, must not be tight lest it favor navel protrusion. The customary triangular diaper of muslin or linen, fastened by a safety pin, is all that is needed for convenience. Rubber napkin covers are unsanitary and should not be used. The undershirt should be of knit wool, or made of softest flannel and open in front. The next garment is a flannel dress, with high neck and long sleeves, twenty-five inches in length and cut in princess style; the outer dress of muslin is made in the same way. The feet and legs must be protected by woolen stockings reaching to the knees. The underskirt and dresses may be fastened with

tapes. In warm weather the sleeves of the flannel dress may be removed. Some choose to fit a cotton waist, cut in princess style, to the top of the flannel skirt. The outer dress may be made with a yoke if preferred, and as tastefully decorated as one may please, provided stiff ruffles and starched garments are not put upon the baby. All the clothing must be changed daily.

CHAPTER IV.

CONVALESCENCE.

The period of convalescence from childbirth is about six weeks. It begins at the end of the third stage of labor and is the time occupied by the uterus and its appendages in returning to a fairly normal condition. In exceptional cases it may last ten or twelve weeks, or even longer. While labor is a physiological process, the excessive waste and repair which belong to this period, united with peculiar nervous irritability, make the patient very susceptible to outside influences and contagious and infectious diseases, and require the most perfect neatness in a surgical sense.

Often, after labor, there is a feeling of chilliness, or even a rigor, which does not last over ten minutes and is not accompanied by a rise of temperature. For this a warm drink, warm coverings and hot water bottles should be provided.

Uterine contractions continue a few days after the expulsion of the afterbirth. They expel blood clots from the uterine cavity, aid in the return of the uterus to its normal size and prevent excessive bleeding, and as they are stronger when the child nurses, the mother recovers more quickly and completely from the effects of pregnancy and labor when she can nurse her child. The nervous pains, which are often a complication at this time, are of no value in recovery and ought to be relieved by medicinal remedies. The discharge from the uterus is called lochia and for the first three or four days consists of blood with clots and shreds of the decidual membrane of the uterus, after which it is lighter in color and consists mainly of blood serum, later still becoming a grayish yellow of creamy consistency. Gradually diminishing it ceases entirely in from two to six weeks.

The breasts become enlarged during pregnancy, through the growth of lobules and increase of fat and connective tissue. Their secretion the first few days after labor is like that in the latter days of pregnancy and is called colostrum. It is more laxative than milk. In women who have borne children the milk secretion be-

gins the second day, but with the first child it does not usually begin until the third day. There is more or less nervous disturbance at this time, with a little rise in temperature accompanied by thirst and loss of appetite. The swollen, overdilated breasts may be painful from pressure and must be relieved by nursing, or by artificial draining with a breast pump, and by massage.

The length of time that a lying-in patient should be kept at rest depends upon the rapidity of the uterine involution (contraction to natural size). After the first nine days she may be allowed to get up, but should keep the recumbent position most of the time. During the third week she may rest in the chair the greater part of the day, but should keep her room until the end of the fourth week, and during the next two weeks only the very lightest duties are permissible. Of course, there are exceptions to all rules, but this is the course to be pursued by the average woman, and even the strongest can ill afford the hazard of imprudence and overexertion at this time.

EFFECTS OF CHILDBIRTH.

The great dilatation which takes place during the expulsion of the fetus tends to rend the adjacent tissues. During first labors very few escape without rents in the mouth of the uterus, the vaginal membrane and perineum. The more expulsive the pains and rapid the labor the greater the danger in this respect. There is a vast difference in the elasticity of tissues, so that some women with small external genitals may bear children without any wounds, while others, who are large and would seem likely to escape, suffer great laceration. When the first labor occurs as late in life as the thirty-fifth year there is the greatest danger of this complication, but by recognizing the coming peril it is often possible, by proper manipulation, to avoid it. In nine cases out of ten this can be done in all labors after the first, and the severity even of first labors can be greatly mitigated by proper care. Superficial tears will heal with only antiseptic treatment. All others, especially when there is hemorrhage, should be closed with stitches. Union by first intention usually takes place. If there is much swelling about the urethra it may be necessary to use the catheter for a few days. The patient may be sufficiently relieved by hot water in a bed-pan so placed that the steam will come in contact with the swollen parts.

Lacerations of the perineum are the most common and they differ much in extent. Chloroform inhalations and moist applications during labor will often soften this part. The after treatment consists in irrigating the wound with antiseptic washes, keeping the parts covered with the proper dressings and being careful that the nozzle of the syringe is made perfectly clean by being boiled thoroughly before each using, and that it does not separate the edges of the wound upon its introduction. With this kind of treatment a large majority of the cases will heal by first intention and the others, with some loss of tissue, by granulation. When there has been great pressure and contusion of the tissues it is sometimes impossible to save them all, and the antiseptic irrigation must be kept up freely to prevent blood poisoning.

PUERPERAL INFECTION. CHILD-BED FEVER.

One of the great dangers of childbirth which has been very materially lessened in the last few years, by the knowledge and care of the physician, is puerperal infection, which in certain places at different times has been so epidemic as to appall not only the pregnant woman, but the care-takers as well. The changes which occur in the tissues coincident with the growth of the fetus render the pregnant very susceptible to danger from without, and, later, in connection with the swollen and lacerated birth-canal, furnish a condition most favorable for the invasion of poisonous germs. The most common germs of puerperal infection are few in number and are detected by a bacteriological examination of the vaginal discharges and debris from the mucous membranes of the uterus. This infection may be general or only local. The latter is confined to the vagina and uterus, and is much less serious than the former, which affects the whole system, and may prove so destructive as to render recovery impossible.

The treatment lies mainly in prevention. The source of the disease being known, it is possible to avoid the cause. This lies in a careful selection of the proper surroundings and painstaking care to secure surgical cleanliness. The most frequent cause of septic infection is the neglect of proper care of the hands, dressings, instruments, and room, and contaminations from foul air as from water closets or defective drainage. In hospitals there is danger from suppurating wounds.

As already stated, the mattress and all other parts of the bed,

occupied during confinement and the lying-in, should be absolutely clean; and we repeat that the pads and sheetings should be thoroughly boiled and dried, the dressings made antiseptic by boiling or dry heat, all utensils used cleansed by boiling, and all water for cleaning or other purposes boiled for thirty minutes, then cooled to the proper temperature. Before dressing the patient or removing any bandages, the nurse should always cleanse her hands with soap and hot water, paying particular attention to the nails, and the perfect cleanliness of her clothing must be maintained.

All dressings should be burned on removal, or cleansed and boiled for an hour before being used again, either by the patient or anyone else, and let it be remembered that while infection usually takes place at the time of delivery it may occur either before or after.

Confinement either in the country or city is open to more dangers from infection than it is in a hospital, because antiseptic precautions are less strict in private homes, their drainage is more liable to be imperfect and refuse is not always promptly and entirely removed.

SUBINVOLUTION.

Under the most favorable conditions the uterus does not return to its normal size until from six to ten weeks after labor. An arrest of this process of retraction of the uterus or its ligaments is known as subinvolution and gives rise later to much of the discomfort which falls to the lot of woman when the pelvic organs are the seat of disease. The changes in the uterus and its appendages, brought about after labor, are due to a lack of blood, the supply of which is lessened by the contraction of the uterine muscular fibers. Failure of proper reduction is also due to some interference with the blood supply. The most common causes are changes in the mucous membrane of the uterus from disease, an oversupply of blood during the last months of pregnancy, inflammation coming on after labor, displacement and polypoid growths. Later the cause may be chronic constipation, assuming too soon the erect position, too much exercise or hard work, and resuming sexual intercourse too soon after labor. Any of these things may not only retard, but arrest the changes so necessary to a healthy condition. A failure to nurse the child may predispose to subinvolution, and

immediately after labor large blood clots, a distended bladder, or displacement of the uterus itself may do the same. It may occur in women who lack muscular tone, or are predisposed to various diseases, but this is exceptional. Usually there is a local cause. Subinvolution is often the cause of ill-health from pelvic disorders. The physician should be given an opportunity to correct all such disorders as soon after labor as permissible, since later they are not nearly as amenable to treatment.

During the lying-in, abdominal palpation will show the progress that the uterus is making in return to a normal size. A fair estimation of its progress may be obtained by a daily examination of the abdomen with the hand. In a general way it may be said that the day after delivery the body of the uterus is a finger above the navel, on the third and fourth days slightly below, on the fifth and sixth days two fingers below, on the seventh, eighth and ninth days three or four fingers above the pubis, on the tenth, eleventh and twelfth days slightly above, on a level or a little below the pubis. This decrease continues until the tenth or twelfth week, when the size of the uterus will be found to be less than normal, after this, engorgements usually give a slight permanent enlargement.

When the involution fails to properly take place there will be an increase and prolongation of the bloody discharge, a coated tongue and constipation. If involution be permanently arrested there will be connective tissue development in the uterine walls and changes of the mucous membrane, and chronic inflammation will be established in the linings of the cervix and uterus.

The treatment consists of the removal of all causes which may prevent the return of the uterus to its normal condition. If not noticed until several weeks after labor there will be frequent bleedings, leucorrhœal discharges, dragging sensations, a feeling of weight and distress in the back and loins, and finally the digestive, circulatory and reflex nervous symptoms of subacute and chronic inflammation will appear.

INCONTINENCE OF URINE.

After labor there may be inability either to retain the urine, or to urinate at all. Either condition is annoying and may give rise to serious consequences. The loss of power to empty the bladder may be due to the position—lying on the back—or to injury to the

urethra or to the front vaginal wall, and resultant swelling. The bladder must then be emptied by a catheter because of the danger of inflammation, or even of infection, if the bladder, from too great distention, loses its normal tone.

A constant dribbling of urine often means an overflow from a distended bladder, and partial paralysis of the sphincter of the urethra caused by injury during labor. The trouble often disappears spontaneously, but may linger for some time. Recovery can be hastened by tonics and electricity.

NERVOUS COMPLICATIONS.

The nervous system also suffers from the additional burden of pregnancy and the shock of labor. Apoplexy at this stage is more frequent in those who are pregnant, or have just been through delivery. Paralysis following labor is due to injury from pressure by the head or instruments, and, again, from failure to use forceps at the proper time, thus allowing the pelvic nerves to be injured by continued pressure. Septic neuritis gives rise to the same symptoms as are seen in ordinary neuritis.

SORE NIPPLES.

Sore nipples are very frequent in first pregnancies and are often due to imperfect development. Small nipples can easily be increased in size by manipulation during the last months of pregnancy and much discomfort and danger thus be averted. Hübner states that fifty-one per cent of nursing mothers have sore nipples between the third and fifth days. The nipples should be protected from pressure from corsets and tight clothing during pregnancy, and, during the last months, washed twice daily with bland soap and water, then anointed with cocoa butter or sweet oil, and, once each day, treated with a saturated solution of alum or a 25 per cent solution of glycerole of tannin. If the latter be used the underclothing must not come in contact with it, because of its permanent stain.

From the first nursing, close attention must be given to cleanliness of the child's mouth. It should be washed out once a day or oftener with a saturated solution of boric acid, and after each nursing the nipples should be washed with the same solution and dried. If at all inflamed they must be covered with a protective ointment as follows:

Boric acid.....	fifteen grains
Castor oil.....	two drams
Subnitrate of bismuth.....	two drams

This may be alternated with extract of witch hazel, diluted with three or four times its volume of water. When there are raw places or cracks on the surface of the nipples use a mixture made of twenty grains of boric acid and one ounce of oxide of zinc ointment; also paint them with the compound tincture of benzoin. A breast-binder and a nipple-shield, made of a glass bulb and a soft rubber nipple, should be used to save the mother as much pain as possible. The nipple is cleansed thoroughly after nursing and kept in a boric acid solution, and the glass bulb washed occasionally in a five-per-cent solution of carbolic acid, or boiled for thirty minutes. If the shield aggravates the trouble by pressure upon a fissure, nursing may have to be given up for a day or two, and artificial feeding resorted to, until healing takes place. Only the most serious circumstances and fear of certain abscess should lead to drying up the milk for relief, unless there is no prospect of the nipples performing their duty because of deformity, or of easy erosion upon any manipulation.

Abscess of the nipple should receive the proper surgical treatment, and eczema, herpes zoster and syphilitic ulcers must have proper local and constitutional treatment.

Engorgement of the breasts may be prevented by skillful massage. If they become suddenly engorged by an oversecretion of milk or exposure to cold, they must be relieved by nursing the child more frequently, by massage or by the breast pump. In addition to this a free movement of the bowels by a tablespoonful of Epsom salts in a half glass of warm water before breakfast, and compression of the breasts by a bandage will prevent further trouble.

ABSCCESS OF THE BREAST.

Abscesses of the breast are of three kinds: 1. Those in the glandular tissue itself, called the parenchymatous. 2. Those in the connective tissue just beneath the skin, called the subcutaneous. 3. Those in the deep connective tissue beneath the gland called the post mammary. The latter form is rare.

All the forms are of microbic origin—the germs entering through the erosions or fissures upon the nipples and, as a rule,

coming from the baby's mouth. A failure to properly empty the milk glands gives rise to a stoppage or stagnation which is a predisposing factor, in a mammary abscess. There is one other source of infection, a rare one, and that is through the mother's blood supply, excretions being thrown off by the mammary glands as well as by the other glands of the body.

Preventive treatment consists, as we have already said, in care of the breasts during the later months of pregnancy and in strict cleanliness in caring for the nipples. For the glandular form, when inflammation is threatening, massage and the breast pump should be employed. These measures would be harmful in a subcutaneous case. In that form an ice bag should be applied to the inflamed part and alternated with a lead water and laudanum compress, and the patient should also take free saline cathartics. Although these remedies constitute the best treatment they may be unable to arrest the abscess, and suppuration may follow. Mammary abscesses are rarely dangerous to life, but if neglected a large portion, or all of the gland may be rendered useless for future nursing. When, for any cause, it is necessary to stop the secretion of milk immediately after delivery, it may be done by a compression bandage and saline cathartics, and, if the patient can stand it, by massage and the breast pump to prevent engorgement.

QUALITY OF THE MILK.

The quality of the milk may be a source of great trouble. The fats and albuminoids show the greatest changes, and this is often aggravated by the manner of putting the infant to the breast; as too frequent, or too prolonged and irregular feedings, alter the milk and render it either difficult of digestion or of little nutritional value. When the baby is nursed oftener than once in two or three hours the milk becomes so concentrated that it is difficult to digest, and makes the child feverish and thirsty, and when the interval between the feedings is prolonged beyond the usual time the milk becomes so reduced as to impair its nutrition. The diet of the mother is also a large factor in influencing the quality of the milk.

Living largely upon vegetables will increase the proportion of sugar and diminish the fat and casein, while an excess of albuminous food will increase the fat and casein and diminish the sugar. In each case the infant receives food ill-adapted to its

needs. The employment of alcohol and malt liquors increases the fat and casein. While it is sometimes necessary to add some preparation of malt to the mother's diet, the indiscriminate use of it can only be productive of harm. The diet of the nursing woman should not differ from the plain mixed diet to which she has been accustomed, with, however, a moderate excess of fluids. Of these, milk taken between meals is the best. Tea and coffee are better withheld, or taken dilute and in small quantities. Cocoa is sometimes useful.

In some cases in spite of every variety of diet to secure a proper consistency of milk for the child, it fails in nutrition and an artificial diet must be substituted. Sudden fright, joy or great anxiety have a peculiar effect upon the quality of the milk, giving rise to indigestion in the infant. This should teach the mother to lead, as far as possible, a quiet, unemotional life during lactation. The quantity of milk varies from total absence of secretion to an excessive supply. Usually at the seventh day there are fourteen ounces in the twenty-four hours, at six weeks it reaches about two pints; at the seventh month three pints and after the eighth month it gradually decreases.

A mother with tuberculosis should not nurse her child since it would reduce her strength and expose the child to infection; neither should one having goiter, or a predisposition to it, for nursing aggravates this disease; and if anemia exists to any great extent the welfare of both mother and child demands artificial feeding. The advisability of discontinuing nursing when the menses appear depends entirely upon its effect upon the child and mother. Various drugs taken by the mother appear in the milk and may produce an injurious effect upon the child.

WEANING THE CHILD.

Weaning the child also depends upon the quantity and quality of the milk and the effect of nursing upon the mother's health. At nine months the baby can usually be fed without trouble. At twelve months there are so great changes in the milk that weaning is desirable, unless it is in midsummer, or the child is recovering from severe illness. Most serious derangements of the system may follow prolonged nursing, particularly of the mother, who can hardly escape feeling the strain of the unusual drain.

WEIGHT.

The average new-born child at first weighs seven pounds, a boy being about a half pound heavier than a girl. A child may weigh much less, yet be perfectly formed, while a few weigh ten or twelve pounds. The weight is affected by the length of the pregnancy, the nourishment of the fetus, the size of the mother, her age (young mothers have small children), and the number of previous pregnancies—the weight increasing up to the fourth or fifth child. There is usually a loss of weight for two or three days after birth, but when the milk comes the infant begins to grow and at the end of the first week is about as heavy as at birth. An average child will gain from one-half to three-fourths of an ounce daily for the first year. There may be periods when there is no gain, followed by periods of increased gain. The average child at three months weighs ten pounds, at six months from thirteen to fourteen pounds; at nine months from sixteen to seventeen, and at one year from nineteen to twenty pounds. Its length at first is from nineteen to twenty inches and it gains from six to ten inches the first year.

The respirations of the new-born are irregular and rapid, about forty per minute. The air cells do not expand until the second day. There is in its respiration elevation of the ribs, a large part of the work being done by the diaphragm. When the navel cord is tied the entire circulation changes, the lungs now receiving the blood for aeration as well as for nourishment of their own tissues. The vessels that connected the mother's circulation through the placenta are immediately blocked with clots and ultimately become fibrous cords. For the first few months the pulse is feeble and rapid, easily disturbed and quickened. During sleep it is about 120 beats per minute, 130 while awake, and 140 or 150 if excited.

DIGESTION.

Saliva is secreted at birth, but in very small quantities. Its diastatic power is weak at first, but gradually increases during the year and at the end of that time is nearly equal to that of the adult. The stomach is small, more cylindrical, more vertically situated than later in life, and of less muscular power. Food in the stomach diminishes rapidly the first hour and disappears entirely in two or two and a half hours. Water assists in the digestion of casein.

The liver is so large at birth as to occupy a very large

part of the entire abdominal cavity. Bile is secreted early and gives to the feces their light brown color. In the new-born they consist for the first few days of meconium, a dark, thick, blackish substance, which, about the fourth day, is mixed with digested milk, so that after this time the feces consist of the residuum of digested milk. They are passed from two to four times daily.

The kidneys are fully developed and functionally active at birth, the secretion of urine taking place before birth. The skin at delivery, because of an interference with the circulation, is of a livid hue, which changes, on the establishment of respiration, to a deep red; later it becomes yellowish and finally in about three weeks assumes the rosy tint common to infancy.

The development of the nervous system depends largely upon heredity, environment and the health of the child. Not until after the first month does the gray matter appear in the brain. The medulla and cord centers are much better developed at birth than the cerebrum. The special senses respond to stimuli at this time, but in a limited degree. Taste and smell can be roused by strong stimulation immediately after birth, but the hearing is imperfect, the sight is but feebly developed for the first two to six weeks, and the sense of feeling or touch is very feeble at first.

Most children walk when a year old, some earlier and others later. Speech is gradually developed, there being no distinct words until the end of the first year, and often not until much later.

PATHOLOGY.

Such of the conditions and diseases as are treated elsewhere in this work we mention here only to call attention to their liability to appear in infancy, and to suggest precautions.

Bruises.—There are often bruises upon the presenting part of the child, usually upon the head. They come in long continued labors from pressure in the adaptation of the head to the pelvic canal of the mother. There is localized swelling of the scalp and connective tissue and some accumulation of blood, like the black and blue spot of an ordinary bruise. The affection is present at birth, if at all, and usually disappears without treatment.

Cephalhematoma may be single or double, and does not appear until two to four days after birth. It is also caused by pressure and is always confined to the surface of one of the cranial bones,

never crossing a suture or fontanelle. It is possibly due to a weakness of blood vessels, which allow a hemorrhage upon pressure. There is no discoloration of the scalp and the tumor is not painful. It disappears in from four to ten weeks.

Discolorations.—During early life there is an exfoliation arising from irritation of the very delicate skin and mucous membranes. Thus eczemas and eruptions are easily developed. The icterus neonatorum, which occurs in about eighty per cent of the new-born, is not a disease, but simply a discoloration of the skin which takes place during the first two weeks of the child's life and disappears when the body has adjusted itself to its new surroundings.

Mastitis, accompanied by secretions in the breasts of both male and female children, occurs quite frequently during the first two weeks after birth. There is swelling, redness and pain which will subside in about two weeks without any treatment, except to cover the breasts with vaseline and borated cotton, or, in case of much swelling and redness of the skin, to use an antiseptic wet dressing.

The Navel Cord dries up and drops off usually about the fourth to sixth day, and the scar will then be clean, but will remain soft until the twelfth day. In some cases the stump does not drop off until the fifteenth day or later. The navel wound is the most common spot of septic infection in the new-born, and should be dressed antiseptically under the physician's care.

If the ligature is not properly tied there may be a hemorrhage before the separation of the cord; again there may be no hemorrhage even if the cord is not tied. But with asphyxia of the first degree, and a strong heart beat, there would be hemorrhage from the cord if not properly secured.

The pulsation first stops in that part of the cord next to the placenta, then gradually lessens along the whole line as the circulation of the infant adjusts itself. If the cord dries up as it should a few days after birth, it effectually prevents hemorrhage, but should it become gangrenous the arteries might expand and permit bleeding. To prevent hemorrhage the ligature should be tied about an inch and a half from the navel, care being used to make it firm and not to cut into the tissue. If the navel end is too short, or has been torn off, a compression bandage should be used, or the individual vessels be secured by stitches. When the cord is very soft and tender an elastic ligature may be used.

When the bleeding from the navel wound exceeds a few drops it is usually constitutional and may be due to hereditary syphilis, septic poisoning, or acute fatty degeneration, but these causes are exceedingly rare.

If the navel wound does not heal readily, because of friction or lack of cleanliness, ulceration may occur. This should be treated with an antiseptic solution, as a saturated solution of boric acid, followed by a dressing of one part of powdered salicylic acid to four parts of starch. The stump should thus be dressed three times daily.

Should the wound heal slowly and pus form there may be a granular growth, which, until removed, will prevent further healing. This condition is best treated by touching the growth with nitrate of silver, then applying a bandage wet in an antiseptic solution. If the growth be cut away hemorrhage is likely to follow.

Navel cord rupture (hernia) is caused by a partial failure in the development of the abdominal walls in the first stages of fetal life. The treatment consists of applying antiseptic dressings to dry up the cord and, as soon as the stump becomes detached, reducing the hernia and holding the parts in place by adhesive bands; or of the radical operation, which should be performed shortly after birth, by the surgeon.

Septic Infection may take place before birth, and show itself, three or more days after birth, in a number of forms which are hard to distinguish. When strict antiseptic precautions are not taken infection of the navel wound is likely to occur, which may be complicated by an inflammation of the neighboring arteries and veins, and possibly of the surrounding tissues. Gangrene may be caused by ulcers of the navel if the patient be neglected. The treatment of all infectious wounds consists in the use of antiseptic dressings and such internal remedies as will keep up the strength and general health. These remedies are often best supplied through the proper diet of the mother. Any injury to the skin may become an infected sore if not antiseptically dressed.

Pemphigus, aside from syphilis, is rare. It consists of vesicles, varying in size from that of a pea to a hen's egg, and of round or oval shape, of which there may be many or only a few. It differs from syphilis in appearing upon the body only, not also upon the soles and palms. The vesicles look like blisters filled

with serum. The disease is probably contagious, but is not easily transmitted to an adult. Its treatment consists in protecting the blisters from injury and, upon their breaking, dusting upon the raw surfaces a one to four mixture of salicylic acid and starch.

Tetanus of the new-born is also a germ disease, the infection entering through the navel wound. It is extremely rare, except in most neglected cases, especially where moist filthy dressings are used for the stump, by uncivilized people.

Gonorrheal infection from the mother is often transmitted to the genital tract of the female child and is the cause of leucorrheal discharge in early life.

Syphilis is more often acquired than is supposed. It may be contracted from a wet nurse, who may be uninfected herself, but is also nursing a child that is infected. Infants may contract this disease from other members of the family, or may give it to them. Infection most often takes place from sores around or within the mouth, and is especially likely to be transmitted by kissing. None but intimate friends known to be pure should be allowed to kiss the baby. On the other hand a child with a syphilitic affection is a constant source of danger to those with whom it comes in contact. The treatment is similar to that for an adult, and should be under the direction of a physician.

Infantile Sore Eyes is a very serious disease, contracted usually during birth, by infection getting into the eyes while passing through the vaginal canal, but it may also be taken from infected amniotic fluid before birth, from the water, utensils or cloths used in bathing, from the hands of attendants, and from instruments. It may also be indirectly passed in many ways from the eyes of one child to those of another. The first symptoms usually occur from the third to the fifth day. There is redness of the lids and a thin secretion of pus, which later becomes very abundant and thick. Thirty per cent of all blindness is said to be due to this disease. As a preventive measure, in all cases of suspected gonorrhea, the vaginal canal must be made antiseptic by vaginal douches, before delivery. (For treatment see Diseases of the Eye and Ear.)

La Grippe in very young infants is hard to diagnose, unless other members of the family are thus afflicted, in which case it is probable that rise in temperature, accompanied by great depres-

sion, is due to this cause and treatment should be given along the same lines as those laid down for adults.

Thrush is an infantile mouth disease due to a parasite and occurs in poorly nourished and artificially fed children. The treatment consists of removing the patches by a saturated solution of boric acid. The application should be made very gently to avoid unnecessary scaling of the mucous membrane. If the child nurses the nipples should be washed in the same solution after each nursing. When artificially fed the food should be made alkaline with lime water. Gonorrheal infection will produce a catarrhal affection of the mouth, which should be treated in the same way as thrush.

Apthæ is a more serious affection in which plainly discolored spots appear in the mouth and change into shallow ulcers. They are also probably due to germs and the treatment is essentially the same as for thrush, but must be more persistent and with stronger remedies.

Nasal Catarrh in very young infants is usually due to syphilis, but may arise from infection received while passing through the birth canal. The treatment consists of clearing the nasal passages with a mild solution of boric acid crystals by means of a small syringe or medicine dropper.

Colic is an early cause of discomfort to infants and is usually due to imperfect digestion, caused by improper food. The symptoms are sudden attacks of pain, shown by refusal to nurse, drawing up the limbs and crying, and are quickly relieved upon the expulsion of gas. Dry heat applied to the abdomen, friction across the lower part of the abdomen, or a warm bath, will give great relief. A soft tube introduced into the rectum will allow the gas to escape, and an injection of water or oil will secure a good movement if the bowels are constipated. The food must be carefully regulated. A drop of the essence of peppermint in a teaspoonful of hot water, or a grain of pepsin, or half teaspoonful of the milk of asafetida is very effective for the relief of pain. Paregoric, opiates in any form, and soothing syrups of the various kinds, should never be used.

The Diarrhea of the new-born is due to improper feeding or to exposure to rapid changes of temperature. If not corrected by the substitution of the proper food with from one-twentieth to one-tenth of a grain of calomel three or four times a day, give

three grains of subnitrate of bismuth and two to four drops of aromatic sulphuric acid to check the frequent movements of the bowels.

Constipation is very common, even in the new-born. The intestines in children are larger proportionately than in the adult, and their walls are thinner and weaker, because of the lack of development in the muscular coat. Excessive constipation in the mother, the small residuum from a milk diet, deficient intestinal secretion, excessive perspiration, rupture, and intestinal deformity, all are causes. The usual treatment is a change of diet, partially at least, if the child is artificially fed. The local effect of soap or glycerin suppositories, or an enema of water and glycerin, a half part solution, should also be obtained. Obstruction of the bowel demands surgical aid.

Ruptures in children are usually remediable and curable by means of properly fitting trusses.

Uric Acid in the urine may be corrected by small doses of sweet spirits of niter, and lime water in the milk.

Phimosis or elongation of the prepuce with contraction may give rise to irritation, or even to convulsions. Treatment consists in cleanliness and a retraction every day, or, if this cannot be done, in a dilatation with forceps and a breaking up of the adhesions with a probe. Should there still be irritation or further trouble resulting from the elongation, circumcision should be performed.

Premature Birth is the term applied to a child born between the time at which it is capable of living and full term, whether the birth be natural or produced. Its possibilities of living will depend upon the supply of proper warmth and nourishment without too great exhaustion. Other things being equal, the nearer it has approached to full term the better its chances for living. A healthy child born prematurely when the time of full term has arrived has equal chances with one born through natural labor at full term.

An incubator best provides the uniformity of temperature required for a premature child. There must be as little disturbance as possible for feeding and bathing. If covered with cotton wool it need not be dressed at all. It should be bathed only in sweet oil, to secure cleanliness, and its napkins removed only when necessity requires. It should not be removed from the incubator to be fed, but its mother's milk, or prepared food, must be given

with a dropper, a few drops at a time being slowly put upon the back of the tongue until a dram or two of nourishment has been taken, the amount being increased as the child grows older.

Premature children, among the poor, often die from lack of care and proper appliances. With the help of the incubator twenty-two per cent of infants born at six months, thirty-eight per cent at seven, eighty-nine per cent at eight, and ninety-five per cent at eight and a half months have been saved.

DISEASES OF WOMEN.

By IDA C. BARNES, B.A., M.D.

CHAPTER I.

HEREDITY.

To begin life well, means to be born of healthy parents, not necessarily those of high mental endowments, but of strong bodies. Often with healthy systematic growth, there has come at the proper stage of maturity great mental power that could not have been foreseen, and never could have developed, had the child by adverse circumstances become weak and imperfect physically. On the other hand, the so-called great men and women are often so weakened by excessive and unwisely directed labor that their children succeed only to their frailties and never rise above the commonplace; and so, too, the athlete, having injured his body by overexertion, may transmit to his child a tendency to weakness instead of strength.

Science requires that only the healthy woman shall rear children, but society ignores the demand, and all that can be done for the present generation lies along the lines of hygiene, careful nursing, physical culture and such education as shall give a proper knowledge of self, and self-control, without which more than accidental excellence can never be transmitted to those to come. It is surprising what changes can be wrought in the physical frame, for, by intelligent coöperation and carefully and constantly following rules obtained from a competent guide, unfortunate hereditary deficiencies may be largely overcome, though it must often be at great cost of time and sadly limited achievements in life's chosen field. The child can be made better or worse than the parent, according to the care and training bestowed.

DIET.

Beginning then at birth, proper food is the primary necessity, and its kinds rank as follows: (1) The mother's milk; (2) The milk of a properly chosen wet nurse; (3) Cows' milk so modi-

fied as to correspond as nearly as possible with the mother's milk. The child's desire alone should limit the quantity of proper food. Girls must never be restricted in diet to make them delicate. Children will seldom eat too much, unless there be too long a time between meals. Food should be taken at frequent and regular intervals, and, after the second year, both meats and vegetables should be abundantly supplied, and only those articles excluded which are known to be harmful. At puberty the diet of a strong, healthy girl will not need to be changed much, time and attention being given to mastication and digestion, but if there be any lack of development a diet adapted to the case must be rigidly enforced, and more frequent, smaller meals may be an advantage.

A school girl who does not enjoy her food will not enjoy her studies, and unless she eats a fairly good breakfast ought not to be allowed to go to school. An ambitious scholar may struggle along for a while without food, but sooner or later will break down. Hurried eating must be avoided, also highly seasoned food and improper drinks. Ice water, soda water, and an excessive use of mineral waters, coffee and tea, are undoubtedly the cause of much indigestion; but warm drinks in moderate quantity, as a small amount of tea, coffee or cocoa, if not too strong, are not so objectionable. To an unhealthy girl of capricious appetite at breakfast, a cup of dilute coffee or tea, or coffee with a little lemon juice and sugar, or a cup of good cocoa, will often give a relish for food. When solid food cannot be taken, soft boiled eggs and warm oatmeal and milk make a good breakfast. Smoked beef, or bacon nicely prepared, will often provoke a desire for other food, but when the appetite is capricious the same articles of diet must not be continually presented. Hot bread and cakes, fried potatoes, sausage and salt fish are forbidden; animal food may be taken once a day; fatty foods are generally beneficial, and sweets and ice cream as desserts are good, but pastries should not be allowed. This diet is outlined for young women of nervous temperament; those of a phlegmatic type (the stolid, heavy, slow and lazy) require different fare. They should have little starchy food and very little sugar, but plenty of lean meat, brown bread, oatmeal and fruit. Barley flour contains less starch than wheat flour, and is therefore better. The fluids should be limited in this class of cases, while large quantities of them are to be taken by the nervous, but principally between meals.

Pure air is a constant necessity to which too little attention is given. In the large cities and in our public schools the air is always contaminated. By proper attention to ventilation, at frequent intervals, if it cannot be continuous, the air in the rooms can be greatly improved, and in the erection of all new school buildings ventilation should be made as easy and perfect as possible. Sleeping rooms should always have fresh air coming into them, and sitting rooms and parlors must also be ventilated, or young girls kept out doors more. Wherever plumbing is used it should, of course, be of the best, and no sewer connection should ever be allowed in a sleeping or living room. To unhealthy surroundings in early life, quite as much, perhaps, as to heredity, are due premature decay, disease and death. The influence of bad air is usually soon seen in adults, but in the young it is not quickly apparent, although more permanent and disastrous results may follow.

CLOTHING.

The clothing of women should secure an equable temperature, and for that purpose should equally cover all portions of the body. There is no excuse for wrapping the trunk excessively in heavy materials and leaving the legs and arms bare, or practically so. The corset is best superseded by a waist to which all skirts are buttoned, that by carrying their weight on the shoulders there may be no pressure upon the contents of the abdominal cavity. It should be borne in mind that corsets or waists that are slightly tight when put on are injurious, although they may soon become loose under constant pressure, so flexible are the tissues under long-continued stress. It is this constriction of the waist which prevents proper expansion of the ribs, overcomes deep natural abdominal breathing, and gives rise to the chest breathing said to be characteristic of women. Again, whatever prevents a free movement of the diaphragm hinders the circulation in the pelvic organs and harm comes thereby. Tight lacing, whether from corsets, straps or belts, gives rise to displacement of all the abdominal organs—liver, intestines, kidneys and uterus. It also tends to make thick walls and to cause large, protuberant abdomens. Of a large number examined by a prominent investigator, falling of the uterus was found in every case of tight lacing, not always extensive, but existing to some degree,

and there were all varieties of displacement, backward and forward, as well as downward. There have been cases in which the position of the stomach was so changed by lacing as to provoke permanent dyspepsia.

Another argument in favor of loose clothing for a young growing girl arises from the fact that, in proportion to her body, her liver is twice the size of that of the mature woman, holds one-fourth of her blood, and cannot be placed under pressure without inviting serious consequences. There should be free movement, free breathing and free capacity for outdoor exercise or work in the gymnasium. In order to secure this there must be no compression of the feet by tight shoes nor lack of balance from high heels. A girl has but a short time for development and must not be hampered, or deformities will result that cannot be corrected. It is well thought that many of the irregularities of development are due to carelessness, or ignorant neglect of health during the two or three years immediately preceding puberty, by which suffering and deprivation are entailed for years to come. This statement is not intended to dwarf the importance of steady development from early childhood, but to secure better hygienic surroundings, while the girl is merging into womanhood, and is likely to neglect physical exercise because of other crowding duties or the mistaken idea that society demands quiet indoor occupations.

SEXUAL DEVELOPMENT.

With the sudden secondary development of the sexual organs and the change in size and shape of the pelvis in girls just preceding the beginning of menstruation, there comes a change in mental aspirations, and a sexual instinct, which until now has been dormant. If for any reason the physical development up to this time has been retarded, it may very seriously affect the secondary development of the sexual organs and give rise to many of the ills of later life, which make semi-invalids of women. When there is great lack or total absence of development of these organs there is a corresponding lack of development in the entire body, and lack of sexual instinct. Such individuals are neutral in type and instinct, and incapable of the highest attainment either physical or mental. This class includes very few, but, unfortunately, the other class—those of defectively developed sexual organization—is so large as to include many women, all of whom are suf-

ferers to a greater or less degree. This is the more to be regretted because so much of it could have been avoided by early care.

At what age girls should be informed concerning the menstrual epoch is not easily decided, since some will menstruate at ten years, others not until several years later. We should, however, make it a rule to inform a child at least a year before her first menstruation, which time, of course, depends upon her general development, the symptoms often being present many months before. So great is the danger from taking cold at this time, and from mental shock, this important crisis in a girl's life must not be overlooked. Girls should be informed earlier, too, than at first may seem necessary, for another reason and that is, if allowed to remain in ignorance too long, they will be enlightened by some rude companion in the most sensational manner, rather than by the careful and interested mother, teacher, or physician, who will so explain the laws of nature as to show the function a wise and indispensable provision by the all-wise architect; thus preventing shock and the unrest which comes at this time to so many girls.

The time at which a girl should be informed of the higher social relations likely to come to her sooner or later must also be left to the guardian and circumstances; but certainly a young woman should not be allowed to ignorantly transgress the rules of propriety, as so many do, when a little explanation concerning the manner in which her forwardness and indiscretion will be translated by onlookers of both sexes, would serve to place her on her guard as to her own protection and reputation. Incidentally it may be said that it is just as wrong for a man to take a liberty as it is for a woman to allow one, but two wrongs do not make a right.

Every woman before entering the bonds of matrimony ought to understand what her duties and privileges will be in the new sphere, and to accept its pleasures and burdens with joy and hope, otherwise disenchantments, disillusionings and dissensions will often mar what might have been a happy home. It is certainly the duty of parents and guardians of young women to properly train them for their greatest work in life.

At the first appearance of her menses the girl must be protected from sudden changes of weather, exposure to cold or exhausting heat, sea voyages and changes of climate, except to a more

favorable one, great nervous excitement, extreme muscular exertion, exposure to contagion of any kind, and from indiscretions of diet that can result in indigestion. The overfed, sluggish girl should have exercise, the book-worm should take fresh air, sunshine and mild exercise, while the overworked girl of active temperament needs rest. If these rules be disregarded at puberty there will be danger of arresting the development of the sexual organs and deranging their functions, thus impairing future health and usefulness. As the general development is nearing completion, it is absolutely necessary that the sexual organs take up their function promptly and perfectly. Those in whom this is not done are apt to be delicate and sterile. Many of the incurable diseases peculiar to women are due to defective development. The well developed woman, though liable to accidents and disease, is able to resist the causes of disease and to recuperate from the injuries of accident.

MENTAL DEVELOPMENT.

Precocious mental development, not usually in any special direction, but in the acquisition, through association with their elders, of a conglomeration of unconnected facts forming a fund of general information, is characteristic of the children of to-day. They also possess a facility beyond their years of acquiring knowledge, but, as should be expected, lack the permanence which comes of gradual development. A slower mental growth, corresponding more uniformly with their physical development, and not acquired at the expense of the latter, is more likely to usher in the larger life replete with usefulness in maturer years.

Too often the emotional nature is cultivated to the neglect of the judgment and the spirit of contentment, and longings for ease and pleasure inculcated at the expense of higher motives and desire to accomplish great and beneficent deeds. All these things tend to the degeneration of correct ideals and to a womanhood of discontent which is a prominent cause of the nervous conditions into which so many women drift, even in their younger days. There is no question but that a right appreciation of circumstances and surroundings does much to secure one's general good.

Unfortunately, competition has crept into our public schools, and children are pushed to the limit of their ability for a few years,

only to finally dwarf their capacity and make of them mediocre women. The object in school life should be to acquire a love for learning and the power of systematic mental concentration, rather than to gain an accumulation of facts soon to be forgotten. The school that does not arouse a desire for knowledge is a failure. Each girl should be studied by her parents or guardian with special reference to her abilities and deficiencies, and given just that course of study and that amount of exercise or work which will secure the best possible development of all her powers through a long life, and physical health must be regarded as the basis, for without it the highest accomplishments can be of no avail. Any course of study that exhausts the pupil and threatens physical disability is detrimental and should be abandoned.

MENSTRUATION.

The conditions necessary for normal menstruation are a good general development of the individual, as well as of her organs of generation. There must be freedom from marked organic disease, and an abundant supply of nutrient materials, and there should be agreeable surroundings. Dependent upon so many conditions, menstruation when properly performed indicates fair health of the individual, and with derangement of the function some disease or bad surroundings are usually discoverable.

Menstruation is governed by the following laws, which aid in determining whether the individual is physically well: (1) Menstruation should be established when the general organization has attained its growth and the sexual organs have undergone their secondary development or are maturing. (2) The function should occur regularly and periodically about every twenty-eight days and should continue from four to eight days, until the change in life, excepting during pregnancy and lactation. The flow should be free, without clots, and contain the remains of the exfoliated mucous membrane of the uterus.

Incidentally, it may be stated in this connection that an erroneous impression prevails among a large class of women, that the danger of taking cold at this time forbids usual cleanliness, lest a warm sponge bath, or the bathing of the external genitals with warm water, may result in a diminished or suppressed flow. That just the contrary plan gives best results cannot be denied. The external genitals should be washed with warm water as

often as the napkin is changed, which should be at least twice daily, and oftener if required. After a warm sponge bath precautions must, of course, be taken to get a good reaction, and for a few hours to avoid exposure. Cold baths, in many cases, will cause suppression and, therefore, should not be taken at this time.

While, as already said, uniformity exists, there is great variation within the confines of health as to menstruation. The time of its first appearance is modified by climate, heredity, surroundings, hygiene, health and disease. Each individual is also a law unto herself in regard to the time of recurrence, duration, quantity and character of the flow, but when certain rules are once established they should continue regularly during good health, and any marked deviation is an indication of some defect which must be remedied. Derangements of menstruation are usually due to defective development of the generative organs.

PREMATURE MENSTRUATION.

This term is applied to the appearance of the menstrual flow before the general development is completed—a condition determined by the girl's general appearance, which indicates immaturity, also a lack of development of the breasts, the pelvis and the external generative organs. The flow in these cases may be scanty or profuse, but is usually painful and irregular. It is apt to occur in young girls, among both rich and poor, who are illy cared for, and those exposed to immoral surroundings, or associated with older people of not the best character. The treatment consists in building up the general health. If in school, the girl should be taken out for a time and given outdoor life with plenty of exercise and little excitement.

Another class, presenting some of the same characteristics, consists of those girls in which there is a true development of the sexual organs before the general development is complete. Here again the menstrual epoch is irregular and painful, scanty or profuse. Heredity is a factor in premature menstruation, so also is over excitability of the brain and nervous system. It may also be induced by the excitement of masturbation. The treatment is the removal of all exciting causes, rest and pleasant mental occupation at home. The plan is to give nature an opportunity to complete the physical development before menstruation is regularly

commenced. Premature development of the sexual organs is abnormal only because the condition precedes the proper development of the general organization.

RETARDED PUBERTY WITH PARTIAL DEVELOPMENT OF THE SEXUAL ORGANS.

Cases are not rare in which there is a good general development and good health, but at the proper age there is no appearance of the menses. Time must be allowed for the difference in climates. The girl in the tropics menstruates three years earlier than her sister in the arctic regions. Hard physical or mental labor may cut off nutrition from the generative organs, and this is especially true in a quiet country life. There are also a few in whom the demand for general development supersedes that of any special organ, and this class of persons will be found to be well nourished. The treatment lies in rest and a change of environment that social privileges may be enjoyed. If hereditary characteristics be a factor the greatest effort must be made to correct these tendencies by suitable surroundings and the most pleasant social advantages attainable. Again, nutrition may be so insufficient, the circulatory apparatus so small, the brain and nervous system so predominate, or the general organization be so imperfect or unbalanced, as to prevent functional activity in the generative organs. Retarded puberty is seen most markedly in those in whom the uterus and ovaries are absent or rudimentary. Usually the entire physical development is defective, so far at least that the girl is undersize, but in some cases the defect is in the generative organs only. The pelvis usually fails to broaden and the hips remain of the masculine type.

An individual minus internal generative organs is a neutral, possessing the characteristics of neither sex, and, of course, is not amenable to treatment.

MALFORMATION OF THE ORGANS.

As has been said, the ovaries are necessary to menstruation, and any defect in them will derange this function. When they are absent nothing can be done. There are cases in which they are imperfect, and menstruation comes only at long intervals, and then only in small quantity. If these cases are seen early they may be partially relieved by measures recommended in delayed

puberty; but they usually come to the physician too late to get much help.

Malformations of the uterus are also causes of menstrual derangement, and originate at some stage in its development—in the embryo, or at puberty. They may be so extensive that there is no possibility of menstruation, although the ovaries are intact. Much can be done by the physician in charge to ameliorate the disagreeable symptoms attending these cases; fortunately the condition is rare.

The forms of incomplete development which result in the small or infantile uterus and the flexed uterus (one unnaturally bent upon itself) are usually attended by difficult and painful menstruation in the beginning, at puberty, or soon after. The menstruation is generally irregular with long intervals between the periods, and the flow scanty and of short duration. The pain is acute and colicky, comes and goes, and is usually relieved as soon as the flow is free. If this be kept up for years, sooner or later there will be backache, pelvic tenesmus, occasional leucorrhea, and nervous disturbances in the form of headache, irritability and weakness of the nervous system as shown by easily induced fatigue, and the digestive organs are usually impaired.

If attention be given to this class of cases when they first begin to menstruate, much can be done to aid in a better development, by treatment for the imperfect and painful menstrual function. This must be done through the general nutrition. If the appetite is poor, and insufficient food is taken, every means should be tried to make the stomach do its duty. Tonics, laxatives and appetizers are indicated, and when the general nutrition is fairly good, muscular exercise should be given with the hope of stimulating the uterine muscles, after which apply the postural treatment. See page 583. For the difficult and painful menstruation of patients who are otherwise strong give ten grains of the bromide of soda and three to five grains of antipyrine in a teaspoonful of mint or cherry laurel water, once in two, three or four hours; but those who are debilitated are often made worse by this prescription, and for them a diffusive stimulant is better, as follows:

Aromatic spirits of ammonia.....	thirty drops
Chloric ether.....	five drops
Tincture Cannabis indica.....	five drops

Give it in syrup of acacia with some aromatic, as cardamon or mint, every three or four hours, according to the severity of the suffering. Belladonna, in doses of the same size, may be substituted for the *cannabis indica*, if the latter does not do well. There are many other prescriptions which can be used, but under a physician's direction.

CHLOROSIS.

Chlorotic girls mature slowly and menstruate late. Chlorosis is a condition in which the blood vessels are imperfectly developed. The aorta is small and thin-walled; there is often fatty degeneration of the walls of the arteries; the ovaries and uterus are small; and the heart and sexual organs may show degeneration. There is usually anemia, and poor muscular and bone development, but a tendency to plumpness with abundant adipose tissue. The face is puffy, the mucous membranes are pale, and the countenance waxy, yellow or green. Menstruation occurs later than usual and is likely to be scanty. The disease is hereditary, and usually manifests itself in infancy, but rarely attracts attention until the beginning of puberty, when the anemia begins to show itself. Although hereditary, chlorosis is greatly aggravated by bad surroundings and insufficient food and exercise. These girls dislike an active life and incline to inactivity of the body, although they may be mentally bright. The treatment consists in a large amount of physical exercise, which should be of a nature to produce more bone and muscle, and not fatty tissue. Sluggish action of the bowels and kidneys should be corrected, and some form of iron should be given to favor blood formation. In cases that are not seen until late in the disease and are much enfeebled, it may be necessary to give massage and rest in bed until the nutrition is so far improved that light exercise may be taken. When menstruation has become regular and the appetite has improved under careful attention, these patients often become much better. The cold bath and cold pack have been advocated, but more benefit is obtained from a sponge bath, of temperature agreeable to the patient, to keep the skin active, than from severer methods. If necessary the cold bath may be used later for its tonic effects. The treatment should be continued even after the more prominent symptoms have disappeared.

CHAPTER II.

THE ACTIVE PERIOD OF LIFE. ITS CHARACTERISTICS AND DISEASES.

To understand how to treat woman during that period when she must bear the strain and burden of her life, it is necessary to consider her personal characteristics. If we believe that nerve influence is the most potent factor in securing normal work from cells and their protoplasm, it is easy to see how the extreme sensitiveness of woman's nervous system may be made a force in promoting the highest functional activity, or, if allowed to run riot, may so interfere with the normal mechanism of the body as to favor continued disease.

Since anatomy and physiology have become the basis of surgery and medicine, the surgeon paying particular attention to the former, the physician to the latter, we find that both are equally dependent, the one upon the other, and that it is impossible to properly treat the diseases of women without considering the physiology and functions directly bearing upon each case. Great advances are being made in the practice of medicine, not so much in the discovery of new remedies as in new combinations of remedies and new methods of managing disease. Less medicine is given and more attention is paid to hygiene. Patients are informed that they must just as carefully follow the directions of the doctor in regard to sanitation, diet, rest and exercise, as in taking medicines in the right quantity and at the right time, and that they must give sufficient attention each day to the accomplishment of these ends. We think there can be no more valuable service rendered in the majority of cases than to convince the patient that each individual must be a law unto herself, with self-limitations, and that the highest art is in acquiring the ability to accomplish the most possible, in any line, consistent with her own good health—not the good health of some other woman. Were this rule followed there would be fewer cases of nervous prostration and fewer premature deaths.

CONTRASTS IN MASCULINE AND FEMININE DEVELOPMENT.

As compared with men the bones of women are smaller and less abundantly furnished with lines and processes for the attachment of muscles; the bones of the pelvis, though larger, are smoother and not as strong as in man, and the arch in front is triangular, and while the cavity is not as deep as in the male pelvis, there is more room in the pelvic cavity. The muscles, although smaller than in men, are not as inferior in quality as might be supposed. It has been claimed that women are less sensitive to pain, but this probably only means that their endurance is greater, and that they learn to bear it because of the functions which make it a necessity; they certainly possess greater mental and moral sensitiveness. It is found that tissue changes, as far as disintegration is concerned, proceed more slowly in women than in men, that they recover sooner from shock and strain, and although they require more sleep, they are able to endure the loss of sleep for longer intervals without breaking down.

THE FEMININE BRAIN AND NERVOUS SYSTEM.

Whether the brain and nervous system of woman differs from that of man has been a subject of much discussion. The development of the brain is shown, not by weight or size, but by its number of convolutions or folds, the infantile brain surface being comparatively smooth, but, as its mental faculties develop, the sulci appear, shallow at first, but growing deeper and deeper as the years of experience are added. The anatomist has found very little difference in this respect, either in the brains or in the sympathetic nervous systems, of men and women, except that the ganglia and their connecting nerve filaments are larger in the pelvic organs of women, and as this nerve supply is most intimately connected with the process of nutrition, which is so active during pregnancy and lactation, it is reasonable to suppose that a higher development of this nerve force in woman always exists.

As to nervous affections, there is this peculiarity: Women, being more emotional than men, are more liable to functional nervous derangements; but men are more prone to nerve diseases based upon real organic lesions, and far more men than women die insane.

WOMAN'S RECUPERATIVE POWER.

It is well known that woman recuperates more quickly than man, that she produces blood more rapidly after hemorrhage, and that after exhaustion she regains her former standard sooner, also that her nutrition is maintained longer and with greater activity, and that, although woman is rendered liable to many and peculiar diseases by the higher development of her sexual organs, and the greater and special functional activity to which they are subject, her greater recuperative power and immunity from various other maladies give her a longer average life than that allotted to man. This law is said to also hold in the lower animals and plants. Dr. Ough asserts that from two to six per cent more boys than girls are born, but that there are six per cent more women than men. Although not possessed of as great strength, woman endures pain longer and lives where man succumbs. Of course, great loss of life results from war, but more men than women die from fevers and contagious diseases in times of peace.

THE SEXUAL INSTINCT.

The sexual instinct is born at puberty—the period of full development of the sexual organs. This instinct is not nearly as strong in women as in men, and many women, before marriage, are entirely destitute of the sexual desire. This is not a bar to fruitfulness; indeed, the most passionate of women have been barren. This appetite is lessened by menstruation, and is diminished by lactation, as well as by pregnancy; it usually also grows less as the change in life approaches, but there are striking exceptions. In the earlier days men and women were polygamous, but woman has always been monogamous in disposition, and man is becoming more so—a result of civilization which is ever approaching the ideal.

THE DANGER FROM UNCONTROLLED PASSIONS.

We must admit that the sexual instinct, uninstructed and uncontrolled, leads astray, else why so many prostitutes, divorces and unhappy homes? Let a pure and proper knowledge of the reproductive organs and their functions be early imparted to the children by the parents, and, as they would shield their boy and girl from deadly disease by keeping contagion far away, so let them ever be alert for moral lepers, young and old, lest by con-

tact with them their lives be as truly poisoned as were deadly drugs administered in sufficient doses to gradually but ultimately destroy them. By early and correct training, direct and indirect, the mind while plastic and pure can be so imbued with the proper estimation of the sexual relation as to prove a sure deliverance to both sexes in unprotected years to come; and, until the age of understanding and responsibility is reached by each individual, parents, guardians and teachers are more to be blamed for most of the transgressions of the moral law than the offenders themselves. For the adult man or woman who would designedly and seductively lead a young life astray there are no words of condemnation strong enough.

It must not be forgotten that the impure and immoral is more apt to reach the average girl through the books she reads than through bad companions, and that the latter often follow as a result of the former. It is much to be lamented that many of the popular books of the day portray characters that belong not to the society of an innocent girl, and are of such a tone as, by their perusal, to make even older people feel guilty of having descended to the companionship of the debased.

NATURAL AND SEXUAL SELECTION.

Natural selection enables individuals to select the surroundings most suitable to their individual growth and, of course, has its influence upon the characteristics of sex—some perversions of natural selection being detrimental to sexual selection by developing peculiarities of sex. Sexual selection develops characteristics which enable animals to live. In considering it, all the features which favor reproduction must be included. It has been said that woman, because of her less defined sexual instinct, is less capable of selecting, but when to that is added the maternal instinct, with which she is so fully credited, it remains to be determined whether she could not select a better father for her children than often falls to the lot of woman, compelled to choose from the number offering themselves. There is a long list of qualifications which, in both sexes, should supplement the sexual instinct. Reproduction, alone, only brings added responsibilities and demands for strength to bear the burdens of training and support. Unless the animal instinct is based upon the higher quality of love, which makes each willing to yield much for the pleasure and comfort of

the other, there will not be that peace and happiness which ought to rule in every home.

The great question as to woman's place in the world would be almost wholly solved were every individual boy and girl taught to be self-supporting, and to this training were added the further teaching that the highest physical function of man and woman is the production of a healthy child of true proportions and unclouded mind, it being understood, of course, that in the majority of cases a woman who assumes the responsibilities of home-keeping is to be exempt from other trades. To properly keep a home is a large enough vocation for the average woman, who should at the same time gain recreation from the outside world, and keep in touch with her husband's business and her country's welfare. She ought to be an independent thinker, and follow some line of research. Then will her children inherit from both father and mother the abilities and talents for which all parents watch so eagerly as the young lives unfold.

Efforts to thwart nature's plans are always dangerous, often exceedingly injurious. The child-bearing period should be early in the married life. Devices for preventing conception often so reduce or injure one or both parties that, later, when children are greatly desired, the would-be parents are unable to beget them, or, at most, are able to produce but a weak and enfeebled progeny.

RELATION OF THE SEXES.

We are indebted to Dr. J. R. Scott of Clay Center, Kan., for permission to quote the following from a paper read by him at Denver last December, before the convention of the Western Surgical and Gynecological Association, and printed in their annual report:

"A large number of women, as far as my observation extends, believe that man in his sexual life is an animal, whose passions must be gratified at all times and under all conditions, regardless of the wife's likes or dislikes. I blush for my sex when I say that a large number of men share in and act upon this belief. I readily admit that man's passion is the more readily aroused and the more active. The male is the aggressor, always, in all relations of the sexes. Women would hate and despise a creature fashioned in the likeness of man without his attributes

--aggression, force and power, call them what you will--the qualities of manliness; but were the male mind not wrongly educated, no such idea as I have stated would prevail. From early boyhood the male, from his surroundings, and later by association with men, impure in thought if not in practice, becomes impregnated with an idea of woman's sexual life which prevails only among women of the town. He therefore grows up believing that women are sensual to an unwarranted degree, and the sexual act, which should be looked upon by him as pure and right, is associated with the baser side of his nature. I hold, and this applies to both sexes, that not one of nature's laws can be broken without disastrous results, near or remote. Hence, when the sexual act is indulged to gratify the animal in man, stimulated perhaps to a greater activity by drugs, without mutual attraction and the ready acceptance of the possible results of such an act, the individual moral tone is lowered. Particularly is this the case when one or both the parties to the act indulge with the deliberate intention of avoiding natural consequences. It is then on a level with drunkenness and gluttony. A man or woman might better cheat, lie or steal; for a reaction will come that will be as disastrous to a person with moral instincts as that following indulgence in masturbation, and we have all seen its bad effects upon both mind and body. We know how unhappy the lives of women are who find no enjoyment in the sexual act, and who acquiesce only from a sense of duty. Many such wives are the subjects of melancholy, and their physical health is as poor as their mental condition.

"Then, too, there is the class whose passions are awakened but never satisfied because of the rapidity with which the male reaches the climax. These are all cases in which mankind have a right to expect the conservator of health to give instruction, and to also be a conservator of peace of mind and of morality. Do we, as physicians, do our full duty in this respect? Do we take the same serious view of a broken natural law that the legal fraternity take of statutory infraction; or that the moralist does of outraged morals?

"A doctor should not countenance the idea that it is necessary for young men to sow wild oats. A large percentage of women's diseases are results of specific infection. Sowing wild oats is a most prolific means of spreading venereal diseases. Many

a woman has borne months of suffering and undergone surgical operations because of her husband's carrying in his person infection acquired while sowing wild oats. It is a doctor's place to relieve suffering in saint and sinner; but he must also prevent disease by every possible means. I also believe that everyone, suffering from venereal disease, who goes into a doctor's office should go out feeling safe from exposure, but also feeling that he has committed such a crime against society that exposure could add nothing to his disgrace.

"I believe that as morals are improved by moral suasion, and by education along sexual lines, that by pointing out to every infected young man who comes to us that he has committed a crime against the honor of man and the virtue of woman, the per cent of pelvic diseases will be perceptibly lowered. Venereal diseases should be dealt with as are other contagious diseases, but the relation of the doctor to the patient prevents quarantine, isolation and danger signals. Silence is a duty we owe those who entrust us with their secrets, but we also owe a duty to the innocent who may suffer from our patient's moral deflection and its very unpleasant but to be expected results. We shut our eyes too much to the consequences of these very prevalent diseases in young men until confronted with a case of pelvic trouble undoubtedly due to specific infection. We then denounce the man in our heart, when he should have been read a moral lecture in the office of the doctor who cured (?) him. . . . This phase of the subject belongs rightly to the field of preventive medicine, hence comes fairly under the subject chosen. Had we physicians, as a class, the moral stamina which we should have, we could limit very materially this form of moral obliquity, and its attendant evils, thereby effectually preventing diseases which we can only imperfectly cure."

CHAPTER III.

GENERAL MEANS EMPLOYED.

We will describe some of the simple methods used in the treatment of women's diseases and their application to them alone, that when mentioned in connection with the cure of any special condition there may be no misunderstanding.

HYDROPATHY.

The use of water in various ways has in recent years acquired a large place in the treatment of disease. Its benign effects in the management of fevers have long been known, but the discovery of its value in the treatment of nervous disorders is more recent. For our purposes, water will be considered principally as used for baths, hot and cold, and for douches. The direct result of a bath is a shock to the cutaneous nervous system. When it is remembered how extensively the surface is supplied with sensory nerves one can easily understand that a great impression can be made upon the nerve centers by direct applications to the skin.

The effects of water vary with its temperature and the mode of its application. To the cutaneous nerves, water is either stimulating or sedative and, secondarily, either a sedative or tonic to the nerve centers. Action and reaction are obtained. Mild stimulation may be followed by a sedative effect and, vice versa, a sedative effect may bring on stimulation. Its action upon the circulation is of the same order; the circulation may be equalized by the primary effect of a warm bath which stimulates the capillary circulation and invites the warm blood from the deeper structures; while the cold bath, by lowering the surface circulation, drives the blood to the deeper structures, and puts more work upon the heart. When the reaction comes the effect of the warm bath is found to be just the opposite of that of the cold one. This change in the circulation is not all mechanical and is a real help in the process of blood making, probably due to the tonic and enervating effects of the cold bath.

The first indication for the use of water in nervous diseases is the need of its quieting effect. For this the warm or hot pack will be found most serviceable, when the patient is too weak or too irritable to take an ordinary bath. To relieve wakefulness and secure undisturbed sleep it is usually better given at bed time before taking the last nourishment or dose of medicine, but should it excite the patient and drive away sleep it must be taken earlier in the day. After the bath, administer either brisk or gentle rubbing, whichever the patient will tolerate best, and if this does not produce the quieting effect, rub her with the following ointment:

Chloral hydrate.....	one dram
Camphor.....	one dram
Rosewater ointment.....	four ounces

To give the bath, wrap the patient in a heavy woolen blanket wrung from water at a temperature of 110 degrees Fahrenheit, and place over this a large dry blanket and rubber sheet. She may be allowed to remain in this bath from thirty minutes to two hours. The small blood vessels of the skin are at once widely dilated, the internal blood vessels are relieved of pressure, the excretions from the skin are excited, and the general relaxation, known as a sedative effect, follows.

As soon as the patient can endure the tonic effect of the cold bath, a linen sheet may be used wrung from cold water of a temperature of 70 to 50 degrees; better to commence with the former and work down to the latter. Wrap the patient in this sheet, and wrap the head with a wet towel; over the wet sheet wrap a dry one, and the rubber blanket over all. At first there is constriction of the small blood vessels of the skin. This lasts but for a moment, and is then followed by a flow of blood to the entire surface; not much heat can be given off because of the blanket, and there is not as much perspiration as by the warm bath. The cold bath is tonic in its action, and is of much value in general restorative treatment.

TURKISH BATHS.

Turkish Baths are very effective in the treatment of rheumatism and plethora, but are seldom well borne by patients who are nervously depressed. Persons with inactive skins and slug-

gish elimination are benefited by an occasional Turkish bath, especially in the change from a hot summer to a cold winter, when the perspiration suddenly ceases and much work is thrown on the kidneys. These baths are also good to relieve kidney diseases. Although some can take them the year around and feel better in consequence, others are thereby rendered subjects of constant colds, and still others complain of faintness, fatigue and irritability following them. The two last classes are harmed rather than benefited by the Turkish bath.

Could this bath be robbed of some of its drawbacks it would serve a better purpose. Proper ventilation is usually lacking and there is danger of exposure to infectious and contagious diseases. The attendants and rubbers are not careful in cleansing their hands, or in going from one patient to another, scrubbing brushes are not cleansed, and blankets upon which patients recline are used over and over again. By furnishing her own blankets and brushes the patient can lessen these dangers, but there will yet be liability to infection from venereal diseases; in fact, sufferers from such troubles most frequent these baths. There should be a room for the separate cleansing of those who have been exposed to contagious and infectious diseases, and their clothes should be disinfected. The Turkish bath is without doubt very valuable in many general diseases, but not noticeably so in women's diseases, unless they be complicated with one or more of these general disorders.

ELECTRICITY.

This is of great value in the treatment of the nervous complications accompanying and resulting from various forms of pelvic disease, when it takes time to reach the seat of the disorder; also for the relief of pain and to stimulate the absorption of inflammatory products. Faradic, galvanic or static electricity is used according to the needs of the case and its effect upon the individual, one responding best to one form, another to another. Electrical treatment can be successfully and safely applied only by the physician, or under her direction, since if improperly used it may result in more harm than good.

EXERCISE.

In the management of diseases of the pelvic organs, and during convalescence it is often essential to employ

muscular exercise and, in order that the inflamed tissues shall **not** be injured, it is necessary that this exercise should be taken by the patient while lying on her back. The extremities can be exercised by first raising one leg so as to form an obtuse angle with the body, holding it there a minute, then slowly returning it to the bed; this may be repeated several times as long as the patient does not become tired. Next the leg may be flexed and extended slowly in the same manner, but not to the point of becoming tired; then flex the leg upon the thigh, and the thigh upon the abdomen and repeat slowly. Each movement should be stopped short of muscular fatigue. The leg is also raised straight and turned in and out as many times as the patient can easily stand it. The other leg is given similar exercise; and the arms are exercised in a similar way, except that both are used at the same time. They should first be raised to form a right angle with the body and the movement repeated several times, then raised above the head and brought down in a line with the body. The forearms are next flexed upon the arms. The hands are exercised by forcibly closing and opening the fingers and bending the wrist in every possible direction. In cases of active pelvic disorders, it is well to elevate the part of the bed upon which that portion of the body lies. These movements are beneficial to those who have gotten beyond the need of massage and, but for the local pelvic condition, could take active outdoor exercise.

Some of the following exercises strengthen the muscles of the back, abdomen, trunk and limbs when these have become weakened by long disease or sickness. For strengthening the abdominal muscles, Dr. Savage recommends the patient to lie on her back in bed, to raise the head and shoulders a few inches from the pillow, hold steadily a moment, then slowly drop back; this is repeated immediately, then an interval of rest taken and the movement repeated again; five repetitions completing the exercise, which must stop short of fatigue. Later the feet should be fixed against the footboard and the patient rise to a sitting position, then gradually fall back, at first reclining on the pillow, and afterward lying flat on the bed, going through the exercise five times. Again, the patient lying on her back brings the bended knee toward the face as far as possible without effort, then forces it toward the face an inch or two. This is done with the other leg also, the exercise

consisting of five such movements with each leg. A more difficult feat is for the woman, flat on her back, to raise first one leg, then the other, from a horizontal to the vertical position, repeating ten times with each leg. Finally, the abdominal muscles are strengthened by placing a weight upon the abdomen and drawing deep abdominal breaths to lift the weight as high as possible, holding it there a few seconds, then allowing the air to slowly escape from the lungs.

To strengthen the muscles of the back, the woman, lying on her back with her feet drawn up, raises her hips until the thighs are in a line with her body, keeps this position a moment, then slowly drops back; this is repeated five or ten times. Lying prone with arms at her side, the woman breathes deeply, raises face and shoulders from the pillow, keeps this position a moment, then lets the head and shoulders fall back. The following is harder: The body is lifted off the bed four or five times, with a rest after each effort, the elbows and toes being the only points of support. The lateral muscles can be strengthened, the woman lying on her side, by lifting the hips and making the shoulder and lower leg the only points of support. It is hard to take systematic exercise alone, and these movements are adapted to those only who are not able to get outdoors. In commencing such exercise only a few movements should be taken at first, and never to the point of weariness, and the number noted each day, that two or three movements may be added daily to each exercise. Next come riding and walking, then some daily occupation.

Baths should be continued all through the treatment to keep the skin active and clean, also for the exercise. The kind of bath should be suited to each case, and that most agreeable and followed by the best results invariably used.

RULES FOR MUSCULAR EXERCISE FOR FAILURE OF MENSTRUATION.

We copy from Skene's "Medical Gynecology" the following rules for muscular exercise for failure of menstruation, in young girls:

"First, with one foot forward a deep breath is drawn and the arms elevated above the head, parallel in front and palms facing inward; then during expiration they are brought down laterally with palms facing forward.

"Secondly, lying on the back, the lower extremities unsupported and the legs crossed, the toes execute circles from within out, the movement occurring in the ankle joint. This is repeated reversely eight or ten times in each position.

"A third exercise is for the patient to stand upright, with feet well apart, the buttocks resting against a table and arms above the head. The trunk is flexed on the pelvis sidewise and forward slowly, five times to each side, pausing after each motion.

"A fourth, with hands on the back of a chair and one foot upon another chair behind her, the patient rises on the toes of the other foot, then drops toward the ground by bending the knees, then resumes the extended position on the toes, finally dropping on her heel as before the start. This is done slowly five times with each foot.

"Fifth. The patient stands upright with feet apart and arms elevated, the body is bent forward, then backward, then pauses in an upright position. Five times each.

"Sixth. Resting a hand upon the back of a chair before her and standing on the leg of the same side, the other leg is raised, and the knee rotated from within out; then reverse the legs.

"Seventh. With hands on the hips and body well back, a running motion is executed, but the patient remains in the same spot, each step bringing the thighs to a horizontal plane; ten times rapidly, then three or four times with an interval between each two. This sends a good current of blood to the pelvis.

"Eighth. Standing with feet apart and hands on the hips, the head describes a circle five times in each direction.

"Ninth. Kneeling on a cushion with knees apart, the body is bent backward and returned slowly to the perpendicular, five to seven times.

"Tenth. This is a passive motion, the patient in a semi-recumbent position. The assistant lifts one leg by a hand in the popliteal space (under side of the knee joint) and another on the sole of the foot. The thigh is flexed on the abdomen, carrying the knee outward, and describing a small circle. Repeat the motion ten times while increasing the rapidity of it. After a pause the assistant again commences, and thirty or forty movements are given to each leg, the patient being absolutely relaxed. Flexion and extension can also be made against resistance."

DISCHARGES OF BLOOD BETWEEN THE REGULAR MENSTRUAL PERIODS.

For this disorder the same authority gives a line of exercises quite as extensive:

"First. The patient sits facing the operator, with hands on her hips and her knees apart. The operator puts one hand on her shoulder and the other under the opposite axilla, drawing her forward and simultaneously twisting her body in the pelvis. She is to resist the forward motion and the operator is to resist the backward motion; six times for each side. Then a direct forward and backward pull is made, the patient keeping the back muscles very tense.

"Second. The patient is to kneel with her hands on her hips, the operator behind her, puts a knee against her and her hands under her armpits, she bends forward while the operator resists, then the operator draws her upward while she resists. When the patient bends forward her body is rapidly twisted several times above the pelvis. This is done five times, with a rest after each maneuver.

"Third. The patient stands in a doorway, the arms vertical, hands against the top of the doorway, while the operator places one hand upon the abdomen and the other between the scapulæ and pushes her forward. As she regains her first position the operator resists and pushes her hand upward, ten times.

"Fourth. The patient stands with her back against the wall, her hands on her hips, and she places an ankle in the operator's hand while the operator steadies her by placing her other hand against the upper part of the hip bone of the same side; the leg is drawn up and out, she resisting, then the operator resists while she lowers the leg. This pump-handle motion is repeated five times for each side.

"Fifth. The patient leans against a chair or bedpost at as great a slant with the floor as possible, while the operator, one hand under the abdomen, lifts the foot, the patient passive; then she depresses the leg while the patient resists. Five times for each side.

"Sixth. The patient leaning forward puts her hands against the wall, chest level, turns the elbows out and keeps the feet apart. The operator, one hand supporting the abdomen, taps lightly upon the sacral lumbar vertebræ (just below the small of the back) with half closed hand.

"Seventh. The patient draws her feet together under the bended knees, lifting the hips clear of the couch, the operator resisting an attempt to draw the knees together. Five times. Then the attempt to separate the knees is resisted. This strengthens the levator muscles.

"Eighth. If the patient is incapable of performing any of these movements, she reaches her hands to the operator, the elbows slightly bent, while her arms are moved at the shoulder joints in all sorts of circling motions while she is passive. She then bends her arms; the operator resisting flexion, she extension."

SWEDISH MOVEMENTS.

"Swedish Movements" are a branch of mechanical therapeutics devised by Ling of Sweden in the earlier part of the present century. A great many machines were made by which different groups of muscles were moved in many different ways, and if patients could not or would not exercise, the machines did it for them with equal benefit to that acquired by natural exercise. In diseases of women, and of those also who are nervously exhausted, the only claim made for this system is that it develops muscle to its full capacity, by which undue nervous irritability is diminished, and in chronic cases engorgements are relieved. Its best results are obtained in chronic functional disorders. The system requires very complicated apparatus, access to which can be had only in large sanitariums, gymnasias and institutions especially devoted to this work.

MASSAGE.

Massage is motion communicated to the tissues of the body from some external source. It may be transmitted directly to the part operated upon, or may be produced through some mechanism. Stroking, kneading, friction and percussion are the four principal procedures. Stroking should be performed with the palm of the hand and its motions should be toward the heart. Friction is usually performed with the tips of the fingers over small areas, but the thumb is far better. The skin ought not to be irritated in this process. Kneading is the grasping of a muscle, or group of muscles, by one or both hands, and rolling or squeezing it or them upon the parts near them. When a limb is held between the palms a rapid to and fro movement is made, the limb being rolled back and forth between the hands. When alternate

pressure and relaxation are made very rapidly, the kneading process is called vibration and requires great skill. Midway between kneading and percussion is pressure with the finger tips or knuckles. Percussion is the last distinct method in massage. The hand may be used, or an instrument called a percusser or muscle beater. In percussion the operator may employ clapping, chopping and whipping.

A few of the applications of massage to women's diseases may here be considered. It may also be noted that massage fails of its end if not given by a thoroughly trained and experienced manipulator, as well as when prescribed without a correct diagnosis, or when advocated as a cure-all. Abdominal massage is helpful only when the abdominal muscles are relaxed. If there are fecal accumulations, massage about the cecum and sigmoid flexure is best by stroking. General massage will increase peritoneal absorption and aid in the absorption of fluids in the abdomen. Rapid circular strokes over the abdomen increase the peristaltic action of the intestines. Functional derangements of the liver and spleen are much helped by massage. Stones in the gall bladder may be dislodged by careful manipulation.

In functional disorders of the digestive system, and in dyspepsia, massage of the abdomen is of benefit, for with its help the stomach does not retain food as long, and the secretions of the stomach and liver are stimulated. It should not be administered when the movements of the stomach are too great. Kneading the abdomen for constipation is one of the surest remedies; in obstinate cases vibration may be used. It is useful in the dyspepsia of anemic girls, but if gastric ulcer is suspected it should not be employed.

In some cases of obesity, massage and proper diet are very beneficial. In pelvic engorgements, and functional uterine troubles, massage and movements aid other treatments. One treatment in twenty-four hours is usually frequent enough, and it should be of forty to sixty minutes duration.

DIET IN DISEASE.

The water taken in sickness should be known to be pure; if it is not it should be boiled and filtered. Distilled water charged with carbonic acid gas is very agreeable to most patients; and water may be medicated by adding cream of tartar, lemon juice,

or any mineral acid indicated. Alkalies or alkaline salts may be added and the water charged with carbonic acid to suit the taste. Tea and coffee, when there is sleeplessness or irritability, are to be taken in very small quantity, if at all, but in cases of exhaustion they may be used as mild stimulants. They are not restoratives but, in a measure, prevent waste. There are no iron-clad rules to be made concerning these drinks; some persons take tea best, others coffee, and some can take neither. The patient should be governed by her past experience.

Tea elevates the bodily temperature, and, in cases of shock, is often better than alcoholic stimulants, since it is followed by no reactive depression. In women's diseases alcohol is seldom needed, unless after a very severe operation upon one accustomed to such stimulants, and it is harmful then if long continued. No one form will suit every case; some doing better on beer, others on champagne, etc.

FLUID DIET.

In cases of acute gastritis, the physician must consider the kinds of food and their purity, rather than the quantity, that shall be given. This is often a difficult problem, but unless solved correctly, there may be a failure to tide the patient over to what might otherwise have been a favorable result. In acute cases the stomach first rebels, and solid food cannot be given; but milk, gruels, eggs in fluid, and beef extracts and juices, can usually be borne. In fevers milk is the best food, in spite of the fact that it will coagulate and is indigestible for some persons. Milk is often best brought to a boil, or even boiled and then diluted with vichy, apollinaris or distilled water charged with carbolic acid gas. It is to be given in small quantities and at frequent intervals—two ounces of milk in two ounces of water. Whey is milk from which the casein and much of the fat have been separated by coagulation and straining. It can be given when milk is disagreeable, and can be made more nutritious by adding the beaten yolk of egg or beef juice.

Eggs are a complete food, as they contain all the necessary elements for the nutrition of the body. They may be beaten up with hot water, strained, and added to clear soup or broth. The English beat up an egg in a cup of hot tea. The Germans like slightly boiled eggs beaten up in hot broth, and also use eggs in

coffee. Beef juice, beef extracts, meat infusion, and other similar articles are good in fever, but may be given in a too highly concentrated form, and stimulate too much. They may be diluted and flavored with the juice of fresh vegetables, as carrots, parsnips, etc.; and these vegetable juices are a valuable addition. The pulp or fine scrapings of meat may be added to dilute extracts of clear soups, in cases of a subacute type. Calf's foot jelly, rice and barley water, chocolate, fruit, soups, oatmeal and the like answer well for a change.

Malt extracts and malted foods are only digested starches, and usually contain ground malt, some wheat flour, a little bicarbonate of potash and milk. The salts and fats are not well represented in these foods, hence it is necessary to add them. Pepsin, the ferment of gastric juice, when properly given with the food in acute cases, is frequently a large factor in saving life. Predigested foods, pancreatin and peptonized foods are very valuable, but often obnoxious on account of their odor and taste. Peptonized food is now easily made in the sick room, from extracts of pepsin and pancreatin. Peptonized milk and peptonized milk gruel are regarded as nearly equal to peptonized beef extracts.

FORCED FEEDING.

It is well to describe here what is known as forced feeding. The patient is first put upon a milk diet, three or four ounces every two hours, increased in a few days to two quarts in the twenty-four hours, given in divided doses. In case there is constipation a mild laxative, as a two to five grain tablet of cascara sagrada, may be given once daily. At the end of a week a light breakfast is given, and soon three good meals a day are taken in addition to the two quarts of milk at and between meals. There may be added thin lean-beef soup, to which has been added five drops of hydrochloric acid, cocoa, a quantity of butter; and a half ounce of cod-liver oil may be given after each meal. If, as a result of this forced feeding, diarrhea or dyspepsia occurs, give only half diet. The urine must be examined and when urates begin to be deposited return must be made to the simple milk diet or the quantity of food reduced.

Another method is to introduce into the stomach an excess of food by an esophageal tube, it being retained and digested, where previously all food had been rejected, much less digested

Debove, who introduced this plan, said that he found no relationship between appetite and digestive power. Powdered raw meat can best be given through the tube, and this is the form of invalid feeding now in vogue in France.

A VEGETABLE DIET.

A vegetable diet can be either full or spare. It consists principally of vegetables, fruits, milk and eggs; unless a very low diet is demanded to obtain a degree of starvation, in which case vegetables alone are used. Although this gives sufficient bulk, it is a tax upon the organs of digestion. When there is more than normal sexual excitement, the vegetable diet answers well because non-stimulating and the stomach irritability detracts from the other center of excitement. Persons having feeble digestive powers cannot take bulky, watery foods containing but little nutrition, as cabbage, turnips, etc., nor be allowed food containing much starch because of the unpleasant fermentation; neither must the starches be given to a person who is very stout on account of their fat forming properties.

THE SPARE DIET.

The spare diet does well where there is retention of excrementitious material, and may consist of vegetables without meat, or with meat in very limited quantity. It is in cases of oppression rather than exhaustion that the forced feeding diet produces such disagreeable results. There are some foods, though not the same with every person, which must be omitted from the diet of the sick; they are such articles as veal, young lamb, pork, duck, goose, fat and oily fish, cabbage, turnips, nuts, dried fruits, and fruits too richly preserved or seasoned. It is well known that more dyspeptics suffer after eating the most digestible foods than after partaking of those articles which from their constitution must be considered not easily digestible. So each case must be studied for itself. The desire for certain food is a partial guide, if the appetite has not been perverted by faulty eating.

FOR OBESITY.

For obesity there are many diets, but they are all much alike and depend upon a lessening of the foods which produce fat. Sugar, starches and fats should be discarded altogether if possible,

or used very sparingly, and fluids of all kinds must be taken only in small quantities; wine, beer, tea, coffee and chocolate should not be used at all.

FOR AGED PEOPLE.

For aged people the diet should not be pushed, even if there be loss of flesh; but the meals would better be given more frequently, five or six times daily, light in quantity and very digestible in quality.

THE POWER OF MIND OVER DISEASE.

There is perhaps no other stimulant that so excites the tissues and glandular activities to their best work as the hope of recovery. This should be based on the fact that everything is being done, scientifically, to place the tissues and glands in the best possible condition for the performance of their functions. There is no lack of harmony between this and belief in our dependence upon a higher power, call it the Great Physician, the Divine Healer, or what you will. Unsustained by the Creator there is no human being who could live a minute. But in the plan of soul healing the Lord uses instruments, even his people, to accomplish the work; and not only are they expected to employ earnestness, tact and judgment, but in every proper way to use material things to promote the cure of sin-sick souls.

Why not so in bodily healing? Shall not the Christian physician, to alleviate suffering and combat disease, use his best ability also, and, while asking for divine guidance and blessing, apply well tested remedies with the skill born of study and experience, rather than try to make the sufferer believe there is no such thing as pain, or lie down supinely and ask God as a reward of faith to do the whole job by miracle? Why should not the declaration of James that "faith without works is dead" apply as well to the sick as to the sinner?

CHAPTER IV.

DERANGEMENTS OF MENSTRUATION.

In all acute and chronic diseases of the general system there may be derangements of the menstrual function. In fever and pneumonia, either during the acute attack or in the convalescence, there is apt to be scanty or missed menstruation, but in a few cases there may be a profuse or frequent flow, due to the relaxation, or to a hemorrhagic condition. This may likewise occur in the eruptive diseases, as scarlet fever, measles, small-pox, and sometimes in malarial fever. The failure to menstruate in these diseases is usually due to bad nutrition.

The treatment must be directed to the management of the constitutional disease, and with recovery will come alleviation of these disagreeable symptoms. The same treatment usually answers for uterine hemorrhage, in this class of cases.

HEMORRHAGE.

If the hemorrhage is very severe, medicinal and mechanical means must be used for its direct relief.

Such cases should be under professional care, but in case the bleeding is so sudden and profuse as to endanger the patient's life before the doctor can arrive, the entire vagina should be filled immediately with absorbent cotton. A one-fourth pound or more is usually required, and it must be packed in so solidly and firmly as to arrest the flow of blood, thus leading to the formation of clots in the uterus.

Antiseptically prepared cotton is also very essential to the stanching of any hemorrhage and the proper dressing of external wounds; it costs but a trifle, and should always be kept in every home, tightly sealed and never opened until an emergency arises requiring its use.

The chronic conditions which impair the nutrition and thus cause menstrual irregularities are scrofula, tuberculosis and syphilis; then, too, there are the poisons caused by lead, tobacco, ma-

laria and foul air. Women who are scrofulous and inclined to fat, and are phlegmatic in temperament, are especially likely to miss their periods, or to have only a scanty flow. In the last stages of consumption menstruation always ceases on account of the malnutrition caused by the disease. This may also occur in those predisposed to scanty menstruation, even in the earlier months of tuberculosis. In the secondary stage of syphilis there is a marked loss of red blood corpuscles, and in the consequent anemia, menstruation is often suppressed, or of short duration. The loss of red blood corpuscles seems to be the cause of failure of menstruation in chronic poisoning. The treatment should be directed to the building up of the system with tonics and proper diet under the most favorable surroundings that the patient can secure.

When the menstrual failure is due to imperfect digestion, lack of assimilation, or imperfect elimination, it is very evident that every measure must be taken to bring all the organs and glands of the body up to their best working possibility. The main causes are improper food, overwork and confinement indoors, or the opposite of this, over-indulgence in rich food, and a lack of wholesome and necessary mental and physical occupation.

The missing of the menstrual period may be due to some nervous shock, excitement, unrest, anxiety, or change of residence. The symptoms of the approaching menses may be present in an exaggerated form, as backache, headache, etc., also more or less derangement of the digestive organs. By beginning early, such cases can often be relieved by securing mental quiet and rest. The bromide of sodium or of potassium, in from ten to fifteen grain doses, is of great value unless the patient is very much depressed. At the same time stimulating food, bathing, friction of the skin, or artificial heat applied to the extremities, aid in the restoration. If mental excitement still prevails, massage, electricity, frequent light meals and attention to the bowels give relief. At the time of the next period some diffusible stimulant should be given, or the aromatic spirits of ammonia in half-teaspoonful doses in a cup of hot water administered every two hours through the day. If this fails, attention to the general health during the month must be given, and, just before the time for the next menstruation, electricity should be passed through the pelvis and the special stimulative treatment renewed.

NERVOUS EXHAUSTION.

This is a fruitful cause of missed menses. This condition comes on gradually with the failing health, and no doubt is often a conservative provision for preventing the more sudden loss of strength, by preserving the blood supply. Occasionally there is increased hemorrhage, which may occur at irregular intervals, where there is congestion of the brain. The flow is then usually accompanied with much pain. The treatment lies in the care of the general disease with stimulants and sedatives to aid the flow and diminish the pain.

Nervous exhaustion, coming on during prolonged lactation, is of frequent occurrence toward the end of the first year, in case the menses fail to appear after the eighth to tenth month, and all the disagreeable symptoms of this disease may appear in full force. A gradual weaning of the child is the most important measure of treatment, and usually the prostration does not come until late, about the twelfth month, the time when the baby ought to be weaned. All other means must also be used to restore the system to its natural tone.

DERANGEMENT OF SEXUAL FUNCTIONS.

There is often a premature sexual excitement in very young children, even while in the cradle, probably due to chafing by the napkins, and later by the clothing, or to worms, or to eruptions about the genital organs. It is not hard to discover this excitation, because such children do not try to conceal their unnatural behavior, but when a little older they are likely to be fond of being alone at least part of the time. If a child is irritable and fretful, with a capricious appetite and a headache that cannot be accounted for, it is well to learn if there is any handling of the genitals, or friction by rubbing against chairs or other furniture, with perspiration and relaxation afterward. The treatment is to remove all causes of irritation and to keep the child under constant supervision night and day. Corporal punishment rarely does any good in these cases, and the old-fashioned method of spanking may only increase the excitation. A great deal can be done by the mother and teacher by drawing the child's attention from herself.

This unnatural sexual excitement, as well as excess of the normal function, is attended by dire results. Even when the appe-

tite seems fairly good, and the stomach is capable of digesting the food in a creditable manner, there is a failure of assimilation and the individual shows a lack of proper endurance, being easily fatigued and exhausted. There is likewise inability to do concentrated brain work, and, if forced to do it, symptoms of irritability predominate. Sleep at first is good, but later there are wakeful nights, especially following overwork. The symptoms are simply those of mere exhaustion. Strength is regained by cessation of the excess, to be lost again upon return to indulgence.

Ignorance of the result, in a majority of cases, leads to a gratification of the sexual instinct which, with cultivation of the excitement, becomes an abnormal passion. In some it is the overflow of a precocious or very emotional nature; in others there may be local diseases of the sexual organs. Perversion of this function by the adult may also lead to disease of these organs. The treatment for the single is to stop the indulgence; for the married, to modify it to the limit consistent with good health. Tonics and sedatives are indicated, and should be prescribed by the physician.

If the people would only understand that it is within the province of the physician to cure this disease, just as it is to cure any other functional disorder, many a wretched individual might be restored to the full control of himself or herself, well, strong and happy. The family physician should always be consulted freely and unreservedly, for this disease or inherited tendency will be as carefully guarded as any other ailment, and the public will never learn through him of the struggle for a better life, which is the privilege of all. The custom of consulting traveling quacks and irresponsible advertising charlatans, masquerading under the name of non-interested physicians, for advice and treatment of these serious disabilities, results in great harm, and sometimes in despair. These conditions are amenable to treatment, and, in the earlier stages, very satisfactory results are obtained and the normal functions restored; even in cases in which there have been many years of sexual excitation and liberal indulgence, appropriate treatment will alleviate the distressing symptoms and restore strength and better health.

A few women have a morbid sexual excitation leading them to be loud in their manners, sometimes hysterical, and they are rendered worse by society and lack of systematically arranged duties.

By proper management, under the care of a physician, they also can be made comfortable and of value to themselves and the community, instead of going to ruin, and becoming a curse to the world.

There are many women who may go through life, if the sexual instinct be not aroused by evil associates, courtship or marriage, without sexual desire, while others may suffer greatly through widowhood, or from the incomplete coitus designed to prevent pregnancy. There are some persons without sexual desire because of defective generative organs, and such should not marry; others in whom it is tardily and slowly developed, if at all, and still others who have the appetite, but experience no gratification because of exhaustion, mental depression or melancholy.

When there is decided organic disease of the sexual organs, which would interfere with the exercise of their functions, it constitutes a barrier to marriage which must not be disregarded, especially if incurable. Functional diseases, as failure of menstruation, and the like, and the non-specific inflammatory diseases do not stand in the way of union.

ACUTE INFLAMMATION OF THE PELVIC ORGANS.

Acute inflammation is the same everywhere, although its course may be modified by the tissues or organs involved. Acute inflammation of the cellular tissues, lymphatics, Fallopian tubes and ovaries is likely to go on to suppuration, while pelvic peritonitis usually ends with exudation. The first step in an inflammation is congestion, accompanied by a deranged nervous condition, and next come its exudations. In some cases the inflammation stops short of suppuration and the products are carried away slowly by the lymphatic system; in others it goes on to suppuration, and sometimes to the formation of adhesions and indurations, binding the pelvic organs down in abnormal positions and compressing their nerves, thus giving rise to reflex indigestion and headaches, and from constant irritation, paving the way to nervous prostration with all its symptoms, as lack of strength, loss of energy and ambition, and inability to accomplish even the most ordinary tasks of life.

When there is pus in the pelvic cavity, a surgical operation is usually the only safe procedure, for, if allowed to remain, there is always danger, in addition to that of blood poisoning, that a rup-

ture may occur from some manipulation or strain and the pus escape into the peritoneum, giving rise to a general peritonitis followed with almost sure death. As long as there is no pus there is no immediate need of an operation, unless the woman's life is rendered unbearable by the irritable condition of the pelvic organs, bound down in unnatural positions and rendered incapable of the performance of their functions; but, if medicinal means fail, surgery may have to be employed.

The duration, termination and consequences of a pelvic peritonitis depend upon the extent of the inflammation and its causes. In some cases, where the inflammation is limited, recovery will take place in a few weeks, with little after effect; while in others the entire pelvic peritoneum becomes involved, the fimbriated extremities of the Fallopian tubes, being included by the exudation, are practically destroyed, and the functions of the ovaries arrested, because of the structural damage. Under these circumstances degeneration of the ovaries often occurs; sometimes they become inflamed and soft, at other times atrophied, probably due to the interrupted circulation within them and the contracting action of the exudation. In some of these cases the organs are so destroyed, or so buried in inflammatory tissue, that at a post-mortem it is impossible to distinguish them from it, a mass of inflammation, covering the uterus and broad ligaments, being about all that can be found. If such persons survive the attack of inflammation they suffer from pelvic pain, which is exaggerated at the menstrual period, unless the flow is arrested entirely by destruction of the ovaries.

In all forms of acute pelvic inflammation, there is fever, pelvic pain and derangement of the functions of the pelvic organs, but the different cases vary as to the other symptoms, according to the degree of involvement; there is usually derangement of the digestive organs, and there may or may not be a chill. The pain is most marked in ovaritis and peritonitis. If the attack comes on at the time of menstruation there may be an increased flow. There is often pain in the bladder and rectum, and tenderness upon pressure in the groin. This pain is increased by movement, and there is not much modification of it until the exudation is complete, when the fever becomes lower. If pus forms there will be another rise of temperature, usually preceded by a chill, and this fever will be continuous until the abscess opens and the pus is freely

discharged. If at this time the fever goes very high, it indicates severe blood poisoning.

There is a form of pelvic inflammation in which blood poisoning develops at the outset and is very dangerous. If the seat of the trouble can be located in the uterus, ovaries or tubes, removal of the cause by a surgical operation is the proper treatment. Blood poisoning, indeed, is one of the chief causes of acute inflammation, and the other principal causes are venereal diseases and wounds. Certain lowered conditions of vitality undoubtedly predispose to acute pelvic inflammation. The treatment consists in giving relief and hastening the termination as much as possible. The most comfortable position is on the back, with the thighs flexed; raising the foot of the bed is often beneficial. The extremities should be kept warm. Warm fomentations applied to the abdomen are gratefully received. Counter-irritants, in the form of mustard paste, turpentine stupes or capsicum plasters, relieve in some cases. Cathartics (saline cathartics are best) are essential to eliminate the blood poisoning, and food that can be assimilated must be given to sustain the strength.

The stomach is invariably more or less upset at these times, especially when the peritoneum is involved. The thirst should be relieved by bits of pure ice or small amounts of sterilized water taken cold, but if that is not retained, try sips of hot water. If vomiting continues, all fluids by the mouth must be stopped, an enema of water given to relieve the thirst and one of peptonized milk to supply nourishment. To relieve the stomach various medicines are employed, the simplest of which is hot water, warm tea or aerated water in small doses, with fifteen grains of bismuth subnitrate every two hours. No solid food should be given when the stomach is irritable.

When the acute symptoms have subsided and there is no evidence of pus, the absorption of the exudate is favored by counter-irritants, as iodine or blisters repeated. While any products of inflammation still remain in the pelvis the greatest care should be taken to guard the patient against exercise. Standing, walking or riding may produce a relapse. The patient should very carefully feel her way in sitting up, and later in walking, especially at the menstrual periods. Any exercise that excites pain should be avoided. These disorders are too serious to be managed entirely by domestic treatment, and advice in each case should be early sought from a competent physician.

CHRONIC INFLAMMATION OF THE PELVIC ORGANS.

Metritis.—Although chronic metritis may be due to septic or to specific diseases, there are many cases which are simply catarrh of the cervix, or of the body of the uterus, or of both combined, and require medicinal treatment only. The specific and septic cases may also need this treatment in addition to surgical relief and constitutional remedies. Catarrh of the neck of the uterus is more common than that of the body of the uterus, but the former, by extending, is likely to involve the body also. The neck and body differ both in structure and function, and there is a difference in the inflammations that occur in them.

The ordinary course of an inflammation in a mucous membrane is congestion and excessive secretion, then suppuration or a purulent secretion, sometimes, though rarely, ulceration, and in a specific case there may be exudation of plastic lymph, then recovery. The amount of damage done depends upon whether the inflammation ends in suppuration, ulceration or exudation. These are typical endings of inflammation, but in a mucous membrane the process may stop at congestion and excessive secretion, and remain there. If this be kept up there will be a change in the tissues, but there will not often be suppuration or ulceration.

Cervicitis.—In inflammation of the cervix there is a very active congestion and secretion from the glands. It is generally like the normal secretion but excessive in quantity. If the congestion continues, the cells of the mucous membrane are shed faster than they are replaced by new cells, so that the surface becomes covered only by young cells, which give it a reddish color. This process is not confined to the cervical canal, but extends outward about half the width of the cervix and is often called ulceration of the cervix uteri. There are other changes which appear in septic, specific and traumatic endometritis, but discoverable only by the physician.

Endometritis is the name given to an inflammation of the mucous membrane lining the uterus. It may extend to only a part of the lining, or it may spread over the entire membrane.

As the inflammation increases, the mucous membrane increases in thickness by increase of tissue and thickness of blood vessels, so that it is too large for the surface which it covers, hence wrinkles, giving the surface a granular appearance. The congestion sometimes extends to the middle coat of the cervix, in which

case the tissues are softened and swollen. Accompanying this condition there is usually leucorrhœa and increased menstrual flow; very rarely the menstrual flow is diminished. In cases where there is a laceration of the cervix this new tissue may become very firm and hard.

Chronic inflammation of the body of the uterus is essentially the same as in the neck, except that in the former there is greater liability to the formation of polypoid growths. Cervical catarrh is not always attended by great constitutional disturbances, but when they do appear they take the form of nervous debility, the patient being easily fatigued, with a change in disposition and lessened mental activity. The leucorrhœal discharge is opaque, thick and tenacious. If the disease is long continued backache comes on, the pain being in the sacral region, and there may be some pelvic pain. All these symptoms are aggravated by muscular exercise and by the menstrual period. If there is also corporeal endometritis (inflammation of the entire mucous lining of the uterus) there will be, in addition to these symptoms, greater derangement of the digestive organs and of the menstrual function—there usually being increased menstrual flow, except in cases of long standing, where it may be decreased.

The predisposing causes of endometritis are imperfections in the general organization and in the development and growth of the sexual organs, and scrofulous or tubercular tendencies. The exciting causes of cervical endometritis are vaginitis and injuries of the cervix; the causes of the corporeal variety are imperfect recovery from the menstrual period and derangements of menstruation. When the uterus is undersize, or malformed, even in a slight degree, so that menstruation is imperfectly performed, inflammation is very likely to come on sooner or later. Unsuitable clothing, sedentary habits, over-fatigue in standing or walking, or anything which interrupts the return pelvic circulation, favors it, and the chronic forms are encouraged by any impoverishment of the blood, as from lack of food, overwork, prolonged lactation, frequent childbearing, or deranged nutrition from any cause. In many instances the sewing machine, the typewriter or the bicycle has been the offending agent by increasing pelvic congestion. Other exciting causes of uterine inflammation are an imperfect return of the uterus to its normal condition after labor or menstruation, injuries to the uterus during confinement or from displace-

ment, abortion, especially if produced, intemperate sexual indulgence, and efforts to prevent conception.

Treatment.—Attention should first be given to the general health. In the earlier stages there is a possibility that this general treatment will answer every purpose if used in conjunction with the vaginal douche once or twice daily. A teaspoonful of powdered borax should be added to the quart of water, which should be as hot as can be borne by the patient. A good douche consists of two or three quarts of water thus prepared, and should be given the patient while lying on her back with the hips elevated. One of the best ways is to have her lie across the bed, her hips well drawn over the edge of the bed, her feet resting on a chair opposite, and a piece of oilcloth to conduct the return flow of water into a slop-jar at the edge of the bed. A douche taken by a patient in the sitting position over a chamber is of comparatively little value, except for cleansing purposes; while that given by the other method and retained longer aids in the reduction of inflammation.

Along with constitutional remedies and the removal of the cause belong attention to rest, diet and exercise. Those who are exhausted require a restorative diet, while those who are of full habit should have a restricted diet. There are medicines which act directly upon the sexual organs, but they must be used under the direction of the family physician, who must be the judge of the advisability of their use at any particular stage of the disease, the quantity needed, and the drugs desirable in each case.

CONGESTION OF THE OVARIES.

Ovarian congestion gives rise to functional troubles, which resemble ovarian inflammation, but differ from it in that there is no diseased condition found upon post-mortem, and that all the symptoms yield rapidly to treatment. The congestion may be of long or short duration. If the cause be removed it may disappear without treatment, but, if continued, may go on to the change of life, rendering the organs liable to more serious complications in the form of inflammation at any time. This congestion occurs most frequently in the unmarried and in young widows who have never had children, and is usually found in both ovaries, with an extension later to the uterus. It comes on slowly in those who are nervous and emotional and who live a life favoring excitation.

In the beginning there is pain and heaviness in the region of the ovaries, generally accompanied by nervous irritability and weakness, the patient being easily excited and quickly fatigued. The pain in the ovaries increases from four to six days before the menstrual period. Later the menstrual function becomes deranged, and there is usually an increased flow, which at first relieves the congestion causing it; when it does not, weakness will soon follow from lack of blood, with nerve exhaustion which may last any length of time. There is often backache and pelvic pain on walking. In the earlier stages, walking sometimes gives permanent relief, but not always. There may be an irritability of the bladder which is purely nervous. Upon deep pressure in the region of the groin there is tenderness of a dull character, usually on both sides. Sometimes steady pressure in these regions gives relief.

This condition yields very readily to the proper treatment. The majority of patients recover and, if the cause is removed, recover without treatment. One of the chief causes is overstimulation of the emotions in those of a nervous temperament, especially among those not usefully employed and permitted to turn their attention to the procreative function, even before development is complete. Stimulating tonics and improper or evil social influences favor ovarian congestion. It may also be secondary to endometritis, sedentary habits or constipation.

Treatment consists in removal of the cause. Often the ending of an engagement in marriage has been sufficient for complete relief. In young patients good results are obtained by directing the attention to things outside of themselves—a change from society to books, the woods and fields and outdoor amusements. Bathing is good, either the sea or shower bath. Tonics to restore the tone, with sedatives, are needed.

CHRONIC OVARITIS.

The ovary is different from other organs of the body, since its function is performed at the expense of a portion of its structure, which is never restored to its former condition. The rupture in ovulation of each Graffian vesicle means the destruction of that vesicle. Rudimentary vesicles mature and repeat the function, and are in turn destroyed. At least the supply ceases before the organization as a whole has reached the end of its activities. In all other organs of the body functional activity is the result of cell

destruction and restoration. The chronic inflammation of the ovaries is more like a chronic inflammation of the kidneys, the pathological conditions being entirely different from those of acute ovaritis, arising from puerperal or specific causes; as following acute peritonitis.

The first step from normal is irritability and nervous disturbances, which are the more frequent from the close connection of the ovaries with other organs. These symptoms are usually temporary, but, if often repeated and prolonged, produce changes in the circulation which finally impair nutrition. This congestion can be relieved by proper treatment, but, if allowed to continue, there will be an increase of connective tissue at the expense of the true ovarian structure, which after a time will be crowded out, and the ovary made useless for procreation. The first changes in the circulation give rise to a swelling of the ovary which makes it larger and softer than usual. Hemorrhage into the ovary sometimes occurs and clots may be found upon the surface. The ovary that is large, tender and soft will, later, become much diminished in size, and though the changes going on may seem like an increasing number of vesicles approaching maturity, they mean a loss of the proper substance of the ovary.

Symptoms are both constitutional and local. The former are depression of the digestive and nervous systems, and the reflex digestive symptoms are a capricious appetite, nausea and some gastralgia. The bowels are frequently constipated and filled with gas. The nervous debility is attended with great emotional disturbances—more characteristic of chronic ovaritis than of any other chronic disease of the sexual organs. There is usually an increased menstrual flow, but, after the inflammation has lasted a long time, there may be a diminished flow. The ovarian pain due to ovulation is increased a few days before the flow, and is usually at least partially relieved after the flow has lasted two or three days. The menstrual flow is more severe if there is also uterine inflammation. The pain likewise depends upon the structure involved; if it is the ovarian structure only, the pain is not as severe as when the peritoneum covering the ovary is also implicated.

All these symptoms are exaggerated by standing, walking, riding or sitting in a stooped position for any length of time. Sexual excitation and coitus cause great suffering. The patient is usually most comfortable lying down. Upon examination the

ovary is tender to touch. The symptoms coincide with those of ovarian congestion to such a degree that we are forced to believe that the congestion is the beginning of the inflammation. The pain in ovarian neuralgia is also similar, but in that affection there is no inflammation and the pain is not continuous. If the patient is placed under treatment early, there is a chance for recovery, especially if but one ovary is affected. The disease in one ovary may go on to complete destruction and the pain then subside, excepting occasional attacks of neuralgia, while the other ovary may remain well and keep up its function. If the ovarian inflammation is accompanied by disease of the other organs, and there is much destruction of normal tissue, it may be necessary to remove the ovaries. This operation is very rarely fatal, and, in the properly selected cases, gives great relief.

One cause of this condition is poorly developed ovaries which predispose to disease, and another is imperfect menstruation. When the uterus is undersize, or turned backward or forward, and the menstrual flow is small and attended with pain, the ovaries are likely to take on chronic inflammation. The eruptive fevers and gonorrhea are factors in some instances. The scrofulous tendency and inherited syphilis are other factors in its causation.

Treatment consists in lessening the blood supply and relieving the pain. This means rest in bed in the earlier stages, with general exercise in the form of massage, or gymnastic movements in the reclining position. This exercise is as necessary for the general health as is the postural position to relieve the local condition. The poor appetite, coated tongue and constipation, or flatulence and diarrhea, can be removed by small doses of calomel, one-fourth of a grain every half hour until four doses have been taken, repeated daily, and followed in two hours after the last dose each day with a Seidlitz powder. The elimination by the kidneys is improved by keeping the bowels well open. This especially applies to cases suffering from non-elimination of effete products. The home treatment of these cases consists of the hot sitz-bath, counter-irritation and the vaginal douche given as previously described. General baths are of service, but should be given under the direction of a physician. Only a thorough study of medicine will give judgment as to when certain medicines should be given or withheld in these cases, even though the remedies and the proper average dose are well known. There is a

long line of medicaments which must be left to the physician in order to secure the best results. It is very important to exercise patience and carefully watch the patient. When improvement comes, too many, forgetting that recovery from this disease is slow, become lax in their care, and thus open the way to relapse.

INFLAMMATION OF THE FALLOPIAN TUBES.

This disease is nearly always secondary to inflammation of the body of the uterus. There is first a congestion of all the structures of the tube, then a secretion from the mucous membrane of a thick, milky fluid, not containing pus. If the inflammation be very severe there will also be involvement of the peritoneum covering it. As a rule both ends of the tube are closed by inflammatory adhesions. Sometimes there are no traces of the inflammation left, except closure of the tubes, but at other times fluid collects in the tubes and their walls become very thin. This is known as tubal dropsy. The inflammatory obstruction of the uterine end of the tube may give way and the fluid be discharged. This may end the trouble, or the fluid may again collect and discharge for several times, and recovery then take place, but this happy termination is an accident not to be expected with assurance. for rupture of the thin walls is apt to occur and to be followed by less favorable results.

Symptoms.—This trouble so follows chronic endometritis that its symptoms are not distinct from those of the latter disease unless there is a complicating peritonitis. There is usually pain in the affected tube, which comes and goes, and is more decided at the menstrual period. Standing or walking increases the pain; the nervous and nutritive systems are more or less disturbed, and there is no fever unless complicated with peritonitis. The tube is tender to touch and can be felt as a hard, thick mass, or series of masses, characteristic of the disease.

The treatment must be applied to the removal of the cause of the primary disease, which almost invariably is endometritis. Surgical means may be required if other procedure fails, or there is danger of rupture of the tube into the peritonum, with the probability of peritonitis following.

CHAPTER V.

DISPLACEMENT OF THE UTERUS.

Many cases of displacement can be managed early by rest with the aid of the postural treatment and proper general medication. In order, however, to be successful the treatment must be begun upon the slightest indication of trouble. The uterus is entirely within the true pelvis. In the diagram (Fig. 1, Plate VIII), the true pelvis is bounded by the line A B, and the long diameter of the uterus corresponds very nearly to the axis of the pelvis, which is represented by the line C D, and is equally distant from all other parts of the pelvis. As regards its relation to other organs within the pelvic structure, the uterus is in the center, a Fallopian tube and ovary being on either side, the bladder in front, the rectum behind, and the vagina below. The broad ligaments are the part of the peritoneum covering all these organs, excepting the vagina, and are attached to the bony sides of the pelvis. The round ligaments, containing muscular tissue, are usually outgrowths of the muscular tissue of the uterus, and, in the form of round cords, start from the uterus near the beginning of the Fallopian tubes, sweep around the sides of the pelvis and attach in front. The utero-vesical ligaments also extend from the uterus to the front walls of the pelvis and are indirectly connected with the front vaginal wall through the connective tissue. The utero-sacral ligaments are likewise attached to the back vaginal wall and to the rectum in the back portion of the bony pelvic canal.

The chief use of these ligaments is to keep the uterus and bladder in position and, with the vagina and other pelvic organs, is sufficient under ordinary circumstances; but, when a great strain is brought upon them, the pelvic floor aids these structures. The relation of the trunk to the pelvis helps in keeping the pelvic organs in place, being so arranged that the line of equilibrium falls in front of the pelvic cavity upon the front bone of the pelvis. This is why it is so important that women stand and walk perfectly erect. By bending they bring this line within the pelvic cavity

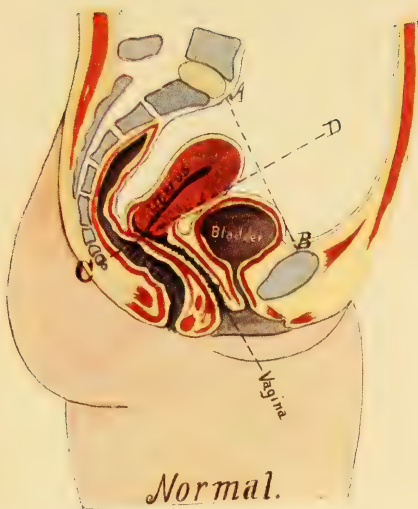


FIG. 1.

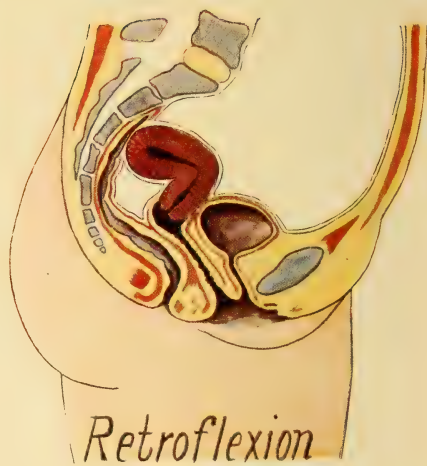


FIG. 2.



FIG. 3



FIG. 4.

and thus place the pressure of the abdominal contents fully upon the pelvic organs. The pelvic floor aids indirectly in supporting the uterus, which is a movable organ, being pushed backward by the distention of the bladder and allowed to fall forward when the bladder is empty. The full rectum also pushes the uterus forward, and the abdominal contents by their continual changing constantly affect the position of the pelvic organs from above. These changes of position are natural, while limited, and temporary, but when the uterus is greatly displaced and permanently remains so, there result disordered functions of the bladder, rectum and general system, deranged menstruation and circulation, and in some cases sterility. In young girls the main cause of all displacements is lack of development during infancy and childhood, often due to defective nutrition and improper positions in sitting or standing, or to some strain; as from lifting heavy furniture, attempting difficult or impossible feats in calisthenics, etc. In married women, the great cause is pregnancy and its attendant changes, and lack of care immediately following delivery.

The chief displacements are anteversion, anteflexion, prolapsus, retroversion and retroflexion. Typical examples of these conditions are shown by the diagrams of Plate VIII., which represent the uterus with its ligaments removed. To study the ligaments and their relation to the uterus, see page 498.

Anteversion is the tipping forward of the top of the uterus, its neck lying in the back of the pelvis without making any bend in the uterine canal.

Anteflexion is a tipping forward of the uterus, the neck also looking forward, but bending upon the body, thus creating a bend in the uterine canal, which interferes with menstruation and proper circulation, and gives rise to passive congestion, followed by inflammation.

Retroversion is that form of displacement in which the uterus and neck both bend backward and rest low upon the rectum. The uterus may be temporarily retroverted by pressure from a full bladder, and not give much cause for unpleasant symptoms, but, if it becomes permanent, irritation usually results.

Retroflexion is a tipping backward of the uterus, while the neck points forward; it is usually the first stage of prolapsus.

Prolapsus is simply a descent of the uterus, often called "falling of the womb." A prolapsus in which the uterus remains

within the vulvæ, is called incomplete; where it extends partially or wholly beyond the vulvæ, it is called complete. There is always some prolapsus with retroversion, and vice versa some retroversion with every prolapsus. Displacements, as a rule, are brought about slowly—months or years intervening before they come under the physician's care. The changes which take place in the uterine supports are the same in all cases, but they vary as regards the cause and the beginning disease. There are three methods of development of prolapsus: (1) The uterus leaves its place because it is too heavy, or the supports are weakened by disease. (2) By a loss of the pelvic floor the vagina, bladder and part of the rectum are allowed to descend and the uterus follows. (3) A class of cases made up of those in which the causes of the first two methods act in conjunction.

The changes in the supports are a lengthening of the ligaments of the uterus after confinement; the condition may also be caused by a heavy uterus, or by continued pressure from above from long standing, stooping or lifting. The resulting pressure upon the blood vessels is thought to interrupt the return circulation. All of these changes are developed very gradually.

Prolapsus of long standing changes the structure of all the tissues. There is a degeneration of the muscular tissues of the vagina, and the ligaments of the uterus lose their characteristics until they cannot be restored. This occurs most fully in old and very feeble women. Where there is a loss of the pelvic floor, a surgical operation is necessary to effect repair. If the ligaments are permanently relaxed, some form of support must be adjusted or the uterus must be removed entirely.

Symptoms.—The symptoms of these displacements are pain in the bladder and rectum, due to pressure upon them by the uterus. There is often a constant desire to empty the bladder and rectum, which is increased by walking, lifting or coughing, and especially by long standing, but is completely relieved by assuming the recumbent position—the position which gives relief in other diseases of the pelvic organs also, but not such complete relief as it affords in prolapsus. The irritation and deranged circulation lead to inflammation of the uterus and other organs, not to an acute, but to a chronic condition of congestion and inflammation of the mucous membrane. It is probable that the endometritis so common in displacement precedes it, but the inflammation

is kept up by the displacement. Menstruation may be deranged, there often being too great a flow, and, in retroversion, the discharge may be offensive. Backache, deranged digestion and depression are also general symptoms.

In considering the cause of uterine displacement, we should bear in mind that the nice adjustment of the uterus which permits the great changes it undergoes in pregnancy renders it exceedingly liable to loss of equilibrium. The shape of the pelvis, if large and shallow, favors the falling of the uterus, although it promotes easy labor; and if the pelvis is tipped forward, there is greater pressure upon the pelvic organs from above—a condition unfavorable to uterine stability.

The tissues of the uterine supports are often imperfect, in which cases they are incapable of doing their work. These imperfections may arise from failure of development, or may occur from sedentary habits in youth, or from the debility of disease. Standing or walking until fatigued brings undue strain and, if kept up, will in time cause falling of the uterus, and a sudden jar, as an imprudent spring from a swing or carriage, may cause it. Active exercise, with plenty of rest between, will strengthen the ligaments, while fatigue will overcome the power of resistance. As already intimated, the habit of walking erect maintains the proper relation between the abdominal and pelvic organs, but stooping disturbs and may lead to their derangement, for it not only brings increased downward pressure, but interrupts the return circulation. The sewing machine, the typewriter, and bending over in the easy chair, are alike harmful, but not as much so as the bending over her desk by the schoolgirl while her body is developing. Heavy lifting, if continued, and abuse of corsets, are factors. General weakness from prolonged sickness, or from extreme old age, is another cause, but one of the most frequent causes is childbearing with imperfect return of the uterus and ligaments to their natural condition, due to laceration, improper care after confinement, and the persistency with which women assume the ordinary duties of the household before recovery can possibly be complete. Enlargement of the uterus from tumors or from inflammation, will also cause prolapsus.

Treatment.—Local applications and quiet rest will reduce the enlargement of the uterus and its ligaments, when, in recent cases, the organ will return to its position. Later, surgical means may

have to be employed. First, correct any defects in the clothing and habits of life that may have caused the displacement. Loose, light clothing should be worn, and sitting, standing, walking or lifting heavy weights should be avoided. Next, restore the uterus to its place by the knee-chest position, assumed three or four times daily for five or ten minutes, and the patient should then rest upon her side with the pelvis raised. Proper external support with a bandage is also beneficial. This treatment is certain only in early cases and when persistent care can be secured. Later, all the attention that the physician can give by local and surgical means must be used to secure any permanent effect.

Displacements of the uterus give rise to the digestive and nervous symptoms found in the inflammatory diseases of this organ, and managed by restoration of the parts, proper diet and proper medication directed to the stomach. In the majority of these cases the vaginal douche is of great benefit, and should be medicated according to the nature of the case. The simplest medication for a douche is a teaspoonful of powdered borax to a quart of water, as hot as can be borne by the patient. The constitutional derangements accompanying the inflammatory diseases of the pelvic organs are principally disturbances of the digestive and nervous systems—the degree of disturbance depending upon the temperament and general health of the patient. Robust, phlegmatic women may have an endometritis, especially of the cervix, for years, without the manifestation of any reflex symptoms, while the very sensitive patient suffers greatly. The impaired nutrition tends also to aggravate the local trouble and prevent recovery.

The appetite may be lacking for a time, then be abnormally active; this is most noticeable with inflammation of the body of the uterus, when there may be nausea as well. In some cases there is a coated tongue, constipated bowels, and poor appetite all the time, with labored digestion indicated by a fullness, flatulence, distress and even pain after eating, and by a yellow tint to the eyes and skin, showing a sluggish condition of the liver. In nervous stomach troubles attended with dyspepsia there is often an over-secretion, or increased secretion, because of the increased movements of the muscular walls of the stomach. In the former condition there will often be a sense of burning in the stomach, while in the latter acid eructations are frequent. Food is carried out

of the stomach before it is digested, hence, there are intestinal gas and disturbances of the bowels, with alternating constipation and diarrhea. The principal treatment of nervous dyspepsia in these cases is to remove the uterine cause. While local and surgical means are employed, relief for the stomach can be obtained by the use of twenty grains of subnitrate of bismuth, given half an hour before meals; when the digestion is labored, pepsin and charcoal taken an hour after meals will give relief. There are a variety of tonics and sedatives that may be used, but should be selected to suit the case at hand, and this must be done by the physician.

The nervous disturbances differ according to the stage of the disease. At first there may be only occasional headaches, or uncomfortable or disagreeable feelings in the head, then a sense of weight on top, and after a long time there may be found a difficulty in collecting the thoughts, irritability, restlessness, disposition to become depressed, sleeplessness, or difficulty in getting to sleep, then waking after a short nap. A sufficient dose of potassium bromide, ten to twenty grains, in the afternoon and again at bed-time, will often give the required rest until the local conditions are remedied. Baths are very beneficial, but they should be of warm or tepid water, then gradually cooled to get a tonic effect.

Rest by lying down is very important in the relief of all inflammatory diseases of the pelvis. It is best to have short intervals of exercise in cases in which it is permissible, followed by long periods of rest in the recumbent position, and long rest and sleep at night with the pelvis elevated. In the more acute forms of inflammation continuous rest in bed is often necessary, the exercise then being kept up by massage. Electricity is an aid in certain cases.

Nearly all medicines which aid in restoring the uterus to its normal function are those which build up the general nutrition, and when the nutrition is fair better results are often obtained by a rather meager diet for a season—discarding meats and rich food. This applies to cases where there is a failure of elimination of the waste products.

DISEASES OF THE EXTERNAL GENITALS.

Little children may have inflammation of the vulva in consequence of the eruptive diseases, as measles, scarlet fever, etc., also as a result of scrofula. In adults it is more likely to be septic and

specific, but many of the mild forms are a result of uncleanness. In little children the genitals may be neglected, or bathed in such a rough and careless way that more injury than good is done. It is best to use powdered borax—a teaspoonful to the quart of warm water, or soap and water, allowing a gentle stream to flow from a fountain syringe, but being careful not to allow the stream to strike directly against the vulva, then carefully clean and dry all the folds with absorbent cotton and throw it away each time. Towels are too rough for this purpose, and sponges are liable to retain infected matter, unless cleansed more carefully than is done in the ordinary household. This attention should be given by the mother or nurse until the child is old enough to do it for herself, which is usually about the time when the menstrual flow begins. The prepuce should receive attention since it is often adherent in girls, as in boys, and may give rise to much irritation and annoyance, and lead to evil results. The physician should see that all these defects are overcome. In middle life the same care must be exercised, especially after menstruation and when there is a free secretion by the glands of the vulva, which may be irritating and offensive; frequent bathing is necessary. Thorough bathing and the vaginal douche before and after exposure will also greatly lessen the danger of infection from diseased husbands.

VULVITIS.

Inflammation of the vulva is usually caused by some other pre-existing disease, except in children, and the specific forms. A scrofulous predisposition, and certain skin diseases, may give rise to an inflammation in this locality, and the small pinworms of children are another source of irritation. If uncomplicated this inflammation may be simply a flush of the skin, or an erythema, which usually does not last long and often passes away without treatment. The purulent form is more defined. The parts are then covered with a thick deposit of pus, and the surface of the mucous membrane, and the skin, if also involved, is raw and red. There may be small spots of ulceration and considerable itching. As the symptoms, heat, tenderness, discharge and itching, are similar to those of vaginitis and are not distinctive, an ocular examination is required to ascertain the exact location of the disease.

Treatment.—The chief thing in the treatment is to secure extreme cleanliness and to keep the inflamed surfaces separated.

There must be frequent washings of the vulva with solutions of borax, or of boracic acid, and, after thoroughly drying the parts, an application made of the powder subnitrate of bismuth, or oxide of zinc, and a very thin layer of absorbent cotton placed between the surfaces. In many cases the following solution answers instead of the powder:

Sulphate of zinc.....four grains
 Fluid extract hydrastis Canadensis.....one ounce
 Water.....three ounces
 Apply three or four times daily.

Vulvitis is difficult to manage in children and unmarried women, and unless the treatment is faithfully applied, results may be hard to obtain. For children, after the bathing heretofore prescribed, sulphate of zinc, one to three grains to the ounce of water, is best applied with an atomizer three or four times daily. When the inflammation extends up into the vagina, the vaginal douche must be used, and for children the soft rubber catheter should be attached to the fountain syringe and a thorough douche of boiled water given. This may be followed by a mild solution of the sulphate of zinc, one grain to the ounce. The patient ought to be kept in bed and under the constant care of a competent nurse.

If this inflammation appears during an attack of scarlet fever, measles or diphtheria, it may show itself only in the form of a mild rash which will disappear without treatment, or it may become permanent, suppurative and persistent. In cases due to inflammation of the rectum, worms, or specific and malignant causes, the primary treatment is the removal of the cause.

PRURITIS OR ITCHING OF THE VULVA.

This is only a symptom, but may occur when it is almost impossible to discover the cause, hence has been given a place as a distinct affection. The patient first notices an itching of the parts which is relieved by scratching and rubbing, but, after affording temporary relief, these measures only aggravate the trouble. Often the tickling, sharp, burning sensation becomes intolerable, and obliges the patient to remain at home, and even lose sleep, unless hypnotics are used. For the cause of pruritis we must look to the cause of the disease which precedes it and gives rise to this symptom. The list of such disorders is quite a long one.

Diabetes, or sugar in the urine, is one of the principal causes of pruritis of the vulva, and any discharge of an irritating nature from the vagina or urethra may likewise cause it; thus the discharges from inflammation of the vagina, from inflammation of the mucous membrane of the uterus, from cancer of the uterus, and from inflammation of the urethra, are usually very irritating and, therefore, especially causative of this disorder. Rectal diseases, and certain conditions or affections of the nerves, presumably give rise to some cases of pruritis; and it is possible that a microbe, attending the debility from local disease and nerve depression, may yet be discovered and proven a cause.

Treatment.—As already intimated, the treatment must first be directed to the cure of the disease giving rise to the pruritis, then measures taken to protect the vulva from the discharges which keep up the irritation. Vaginal discharges can usually be stopped, excepting those from cancer, and from these relief can be obtained by vaginal douches of carbolic acid solution, and afterward placing medicated cotton in the lower part of the vagina to catch the discharges. For the diabetic itching, separate the lips of the vulva while urinating, to prevent contact with the urine, then dry the meatus with cotton. The parts may be further protected by thoroughly applying an ointment of fifteen grains of boric acid powder mixed with a half ounce of vaseline. This treatment must be thoroughly and persistently kept up if a good result is expected. The hardest cases to treat are those in which the symptoms cannot be ascribed to any special disease of these parts. In these cases the skin is often bleached in spots, and is hard and inelastic, and, although they can always be relieved, some such cases are incurable. Bathing with hot water and borax usually does well, and thirty grains of chloral hydrate and twenty grains of camphor with two ounces of rose water ointment is very good where it does not cause smarting. There are many other remedies, but they give best results when used under the careful management of the physician.

HYPERESTHESIA.

Hyperesthesia, or an irritableness of the vulva, occurs usually in young married, or sterile women, or after the menopause. There is great sensitiveness of the parts to touch, and pain in coition. While it may arise from a general nervous condition, it probably more frequently comes from incomplete coitus. At the menopause it seems to be due to a malnutrition of the parts.

Treatment.—The treatment consists in temporarily relieving the condition until pregnancy takes place, when it will be better and, after labor, will generally disappear. Boroglyceride, and tannic acid and glycerin, applied to the parts, are good. When there is free secretion from the vulvo-vaginal glands, a wash of one part of bichloride of mercury to two thousand parts of water answers well. Constitutional remedies should be given for the debility, and sometimes a surgical operation is necessary.

VAGINITIS.

This is an inflammation of the vagina, caused by the extension of inflammation from the vulva, or from the uterus, or due to an infectious fever, or to a specific venereal disease. The lining of the vagina is more like the skin than like the mucous membrane, hence its inflammation resembles an inflammation of the skin rather than that of a mucous membrane. In the acute cases the symptoms are a sense of internal heat and fullness, and, later, pain in the vagina and uterus. In severe cases there will also often be pain in the bladder and rectum. There is slight fever and loss of appetite with a profuse discharge.

Treatment.—Use medicated douches, as for inflammation of the vulva, and treat any disease which may give rise to it, or with which it is complicated. The remedies recommended are simply for home treatment; stronger medicines must be applied only by the physician.

UTERINE FIBROIDS OR TUMORS OF THE UTERUS.

These give rise to symptoms of disease through pressure upon adjacent organs, and severe hemorrhages. They were formerly treated entirely by medicine, but now almost as exclusively by surgery, which is the only means of a perfect cure. Relief, however, can be obtained by medicines and electricity, and often a patient may be tided over the menopause when, with the decreased supply of blood to the pelvic organs, the tumor gradually decreases in size, but if there is excessive hemorrhage, she must be kept quiet and off her feet. The medicinal treatment for hemorrhage must be pushed and should be under the physician's care. For a vaginal injection when there is much flow of blood, two quarts of hot water with an ounce of vinegar will often be helpful. Well fitting abdominal supporters may give great relief.

CANCER.

Cancers of the pelvic organs appear most frequently near the menopause, or after it, at a time when the eliminating power of the body is beginning to fail. The direct treatment is surgical, whether by the knife or caustics. The former is to be preferred as less painful and more sure. All articles of diet which prevent elimination should be avoided, as tea, coffee and alcoholic stimulants, and particular attention should be given to the complete elimination of all waste products of the body, as a preventive treatment at this time of life. The food taken must be easily and properly digested; the kidneys must do their whole duty; and the liver and intestinal tract must be carefully looked after. Turkish baths are often of great value in these cases. There should be taken a proper amount of exercise. Undue elimination and over-exercise create debility again, and frustrate the very object sought. The medicines are to be directed to the building up of the general health, the relief of pain, and the removal of disagreeable odors.

CHAPTER VI.

DISEASES OF THE URINARY ORGANS.

The urine is slowly secreted by the kidneys and collected in the bladder drop by drop, the latter acting as a reservoir which at stated intervals expels its contents. A healthy woman urinates from four to six times in the twenty-four hours, and passes from thirty-five to sixty ounces daily, varying with the season, more being passed in the winter than in summer, and with the amount of fluids imbibed. Neither concentrated nor limpid urine is well borne by the bladder, and, unless emptied at the proper time, this organ is injured by distention, and bad results may follow if the retention continue. Women are very foolishly negligent of the urinary organs, and, as a consequence, not only the bladder, but the kidneys also in time become disordered, first by congestion then by catarrh. Sudden changes from heat to cold also give rise to trouble by quickly changing the character of the urine and thus causing an irritableness of the bladder. Under these conditions all stimulating drinks and foods should be avoided, and, in youth and old age, particular attention must be given to cleanliness of the genitals to prevent extension of disease to the urethra and bladder.

Functional Diseases of the Bladder are due: First—To imperfect tone of the nerves controlling it and the urethra; as in case of the irritable bladder in which there is frequent urination, and sometimes incontinence. Second—To diseases and derangements of the general nervous system, as in hysteria, and diseases of the brain and spinal cord. Third—To diseases of the nutritive system; as in cases attendant upon, or following malaria, the eruptive fevers, and constitutional diseases. Fourth—To diseases of the other pelvic organs; as ovaritis, metritis, pelvic peritonitis, and displacement of the uterus.

The treatment must be directed to the relief of the original cause, upon the accomplishment of which the bladder symptoms will disappear of themselves. The various manifestations of

functional diseases of the bladder are frequent urination, difficult urination and retention, painful urination, pain after urination, and inability to retain urine. These symptoms also occur in organic diseases of the bladder.

Neuralgia of the Bladder or of the neck of the bladder, can generally be traced to anemia, malaria or nerve exhaustion, and must be reached by general treatment for these diseases.

Incontinence or lack of power to retain the urine is usually a childhood disease, but may often become persistent and last into later years. It is due to defect in the sphincter muscle, which keeps the urine in the bladder until in response to an act of the will this muscle is relaxed and the urine voided. It may also be caused by excessive irritability of the bladder which overcomes the sphincter; and the two causes are sometimes combined, producing a still more obstinate case. The habit of unconsciously voiding the urine at night is not only distressing and annoying, but predisposes to bad habits and often causes the individual to catch cold. It is sometimes caused by a defective nervous system, but is undoubtedly more often due to lack of training in infancy. Often the exciting causes are worms, irritation of the bladder from an eruptive fever, a cold, piles, and irritating urine from excess of uric acid. Some cases are easily cured, while others resist all forms of treatment. As a preventive, the heartiest meal should be taken in the middle of the day, but little fluid allowed toward evening, and the food must be plain and unstimulating. The bowels must be kept regular, no coffee or tea permitted, and the patient put to bed only after the bladder has been thoroughly emptied. The mattress should be hard and the covering slight; the sleeping room must be well ventilated, and the genitals should be kept clean and dry; no places of amusement should be visited after dark, and the patient should be awakened to urinate when the family retire. If the bed is found wet the patient should be awakened and reasoned with if able to understand. If due to improper handling of the genitals, every means must be used to stop that bad habit. In women, partial inability to retain the urine is usually due to some injury or displacement, for which the physician must carefully adjust the proper treatment to each patient—medicinal, and, perhaps, surgical as well.

In some cases incontinence has been found due to lack of bladder capacity, and permanently cured by distending the blad-

der every other day for six weeks by injecting a four per cent solution of boric acid to the point of discomfort, with a fountain syringe, but this must be done only under the directions of the physician, who will use all the antiseptic precautions.

Due to a fault in the general nervous system, many women are annoyed by frequent urination whenever excited in any way. They are sensitive and sympathetic, and joy, fear or sorrow causes it, the oftener they urinate the oftener the necessity occurs. If the will power is strongly exerted to resist the inclination, recovery will usually follow.

PARALYSIS OF THE BLADDER.

The principal functional derangements of the bladder due to nutritive and nervous diseases are incontinence and paralysis; but hysteria also is often a cause of retention, as well as of incontinence of urine. Disease of the spinal cord may be a cause, giving rise to permanent paralysis; and there may be a temporary paralysis caused by dysentery, diphtheria or disease of the bladder walls. In the latter case in elderly people, the prospect of recovery is favorable only under prolonged treatment. In cases where there is fear of distention, the bladder should be emptied artificially at stated intervals, and it is of the greatest importance that the catheter be surgically clean. If it be boiled for thirty minutes in soda water, there will be no danger.

VARIOUS ABNORMAL CONDITIONS.

Abnormal urine constitutes one of the many factors of bladder derangement. Normal urine is of a certain character, and any change in it is quickly felt—if too acid, too alkaline, too limpid, or too greatly concentrated, the bladder inclines to expel it.

Deposits of urinary salts in the walls of the bladder may irritate and tend to a chronic condition. Beginning with these small deposits, their rough surfaces favor additional deposits, until stones are formed, but this usually occurs only where there is decomposing urine in the bladder. When there is a deposit of uric acid, there is either an excess of the salts in the urine, or a condition of the secretion which permits deposit when the uric acid is present in normal, or even less than normal quantity. It is often necessary to make several examinations of the urine in twenty-four hours to discover an abnormal specific gravity, for often

at other times it may be in excess, and give rise to considerable irritability. A bladder that is irritable at all times, even when the urine is found to be normal, is likely to be so because of nervous disorders, and must be treated along that line.

The symptoms arising from abnormal conditions of the urine are frequent urination and pain after urination, and when these abnormal conditions are allowed to persist for a long time there is danger of a chronic inflammation of the bladder. In cases of concentrated urine, due to fever, the treatment consists in drinking a liberal amount of water, usually of some of the alkaline waters if the urine is too acid. In digestive troubles, where there is much acid or a saline deposit, attention must be given to diet, bathing and regulation of the bowels, and to taking a proper amount of exercise. Where these deposits in the urine are found there is usually some defect in the assimilation which must be corrected. Limpid urine is usually due to brain disease, or some nervous trouble, and the treatment must be directed to this cause. Malaria is another cause of derangement of the bladder, and is most easily discovered by noting its periodicity. The treatment, of course, is for the malaria, the relief of which is promptly followed by relief of the bladder trouble.

Functional disease of the bladder, due to disease of the adjacent organs, often occurs. The symptoms are not unlike those due to organic trouble, except that they are cured by relieving the causative disease. Disorders of the rectum may cause pain in the bladder, and chronic hemorrhoids often cause frequent urination. A great many cases of spasms of the vagina are complicated by an irritable bladder. Acute peritonitis and cellulitis cause great pain in the bladder, giving rise to the desire to urinate without the ability to make the straining effort; later, the adhesions of a pelvic peritonitis often prevent the normal filling of the bladder, thus producing frequent urination. Occasionally, paralysis of the bladder arises from a swelling which renders powerless the bladder muscles. This may occur in diseases of the mouth of the uterus, in inflammation around the uterus, or in a pelvic peritonitis.

Inflammation of the ovaries, or displacement of these organs, may occasion great pain in the bladder, or frequent urination followed by great pain; next come nervous depression and consequent nutritive disorders, then danger of organic disease of the

bladder unless the cause be removed. The treatment lies in removing the ovarian trouble by medicinal remedies and care, or by the surgical removal of the organs themselves, whereupon the bladder irritation will disappear.

ORGANIC DISEASES OF THE BLADDER.

We have seen that many conditions give rise to symptoms which also belong to real bladder disease. When the bladder itself is diseased treatment must be applied directly to that organ. The simplest of the organic changes occurs in congestion of its mucous membrane, which, in the acute form, comes on suddenly, frequent painful urination being the chief symptom, though there may be a sense of heat and heaviness in the region of the bladder, which is increased by walking or standing. When the urethra is involved, the patient complains of the urine scalding. Usually there is no disturbance of the general system.

Congestion of the Bladder is caused by exposure to cold, especially during the menstrual period, wetting the feet, over-exertion, as in walking or using the sewing machine, constipation from sluggishness of the portal circulation, excessive venereal indulgence, too free use of stimulants, and eating improper food. The treatment is warm foot baths, hot applications over the stomach, rest in bed with the pelvis elevated, and laxatives for the bowels if constipated. The vaginal douche of hot water often gives relief. Any derangement of the urine must be corrected.

Hemorrhage from the Bladder is usually caused by some disease of that organ. When due to congestion, the blood may ooze from the free surface of the bladder, or from varicose veins of this organ, or from beneath the surface of the mucous membrane from places that appear as bruised spots. The blood may coagulate and pass in clots, or may serve to color the urine. Bleeding from this cause rarely prostrates the patient. The hemorrhage may also be caused by malaria, cancer, ulceration and sloughing of the mucous membrane, and by the hemorrhagic habit which is common to some women. In all cases the patient must lie still in bed. The treatment depends upon the cause and must be managed by a competent physician.

Cystitis, or Inflammation of the Bladder, is quite common among women, and the term is usually applied to inflammation of the mucous membrane. The pathology of acute cystitis is the

same as that of inflammation of any other mucous membrane in the body. The surface of the bladder is reddened and covered with thick mucus, and some pus cells are found within the folds. If the bladder be allowed to be distended too long with urine, the entire mucous membrane may slough off. This is most apt to occur in the retention after childbirth.

The first symptoms are those which belong to the organ itself—frequent urination, pain, and pain after urination, with a desire to strain. Often in acute attacks there is not much, if any, change in the urine; the reaction at first is acid, but changes to alkaline if long retained. If there be a little blood the urine will appear smoky, and if decomposed it will look hazy. In the chronic form it is of a pale, dirty yellowish hue, or it may be of a deep red from the presence of blood. Flakes of pus and shreds of tissue with more or less abundant mucus make the sediment vary in different cases, and in different degrees of inflammation.

When there is intense pain in the bladder, if the symptoms are caused by neighboring organs, there may be great rectal irritation, or a congested uterus with free leucorrhea, or different forms of uterine inflammation; menstruation may be disturbed, there being too free flow from the congestion, or an entire failure of the period because of reflex nervous disturbance. Neuralgia of the uterus and ovaries may be brought on in this way. The symptoms referable to the general system may be abnormal ingredients in the blood, or a poor condition of the blood. The digestive system is often more or less upset, there being some nausea, especially at the early morning meal, a loss of appetite, and longing for peculiar foods, which, when obtained are not wanted. The nervous symptoms are easily explained—arising from the abnormal condition of the blood and broken rest at night. The bowels are usually irregular and constipated, interrupted by attacks of diarrhea—nature's method of relieving the system of poison. The skin of a patient with chronic cystitis is usually sallow, loose and of a lifeless feel. The perspiration may have a urinous odor. The causes of cystitis are direct injuries, blows, fractures of the pelvic bones, displacement of other pelvic organs, thus causing pressure upon the urethra, or dragging the bladder out of place, injury during labor, and violent and exciting copulation.

Abnormal urine, if long continued, will cause cystitis even in a healthy mucous membrane, but very much sooner when the

surface is rough or tubercular. When there is an inflammation, mucus is thrown out to alleviate it, but this in turn is decomposed and then aggravates the disordered condition. Women often retain the urine too long because of lack of convenient opportunity to void it, and thus do themselves great injury by setting in motion a train of conditions leading to inflammation of the bladder. Deposits of the different urinary salts also irritate the mucous membrane and their continued action may promote a cystitis. Inflammation of adjacent organs may extend to the bladder, and some constitutional diseases, as the eruptive fevers and syphilis, may affect this organ.

Drugs, improper food and the virus of gonorrhea are causes of inflammation of the bladder. Cantharides is an exciting drug; turpentine and arsenic will produce active congestion; alcoholic beverages, continued a long time, give rise to a low grade of cystitis; and large doses of the chlorate of potash may cause an active cystitis. Foods will not cause inflammation in a healthy bladder, but may irritate an unhealthy one, hence all irritating condiments, alcohol, asparagus, onions, etc., are better avoided in these diseases.

Treatment.—This disorder requires local, as well as constitutional treatment. In this connection, as elsewhere, only the milder forms of treatment will be mentioned. Rest is always necessary. The urine must be so modified as to alleviate irritation and pain as far as possible. The skin should be kept in a healthy and active condition, and the bowels open and free. Much benefit is derived from the use of salts to the securing of great looseness of the bowels. Indigestion, malnutrition from any cause, gouty, tuberculous and rheumatic tendencies, all aggravate cystitis and must be treated in order to relieve a case caused by these conditions. It is very important that a large quantity of pure water be taken; milk is of great advantage, and a milk diet has been known to entirely cure some cases. Not more than a pint of it must be taken at one time. Milk agrees better with some if boiled, than taken either cold or tepid; and some are able to take a gallon of it per day. If the cream disagrees, skimmed milk should be used, and, when the bladder irritation has disappeared, gradual return may be made to a solid diet by combining food with the milk in various proportions.

In the beginning of an acute attack, vichy water or flaxseed

tea will answer well. The infusion of buchu always acts favorably when it can be borne by the stomach, or the fluid extract of buchu in teaspoonful doses once in two or three hours may be used instead. The benzoate of ammonia, in ten-grain doses, acts well in proper cases. There are many other drugs which give great relief and restore to health, but they must be administered by the physician.

THE MENOPAUSE.

The menopause or permanent suspension of the menstrual function is usually known as the change of life. It usually occurs between the ages of forty-five and fifty-five; it may come earlier or later than these limits; the average is at fifty. It does not follow that because the menstrual function began early in the life of an individual it will therefore cease early. To women in good health the approach of the menopause is heralded by a lessening of the time of the periods, with a gradual diminution of the amount of the flow, then a period may be missed, followed again by regular periods for a few times, and then the flow ceases entirely. In other cases six weeks may intervene between the periods, which, when they do occur, are inclined to be excessive. The time consumed in the change to complete cessation varies from six months to two years, and sometimes more.

Being a natural phenomenon the menopause ought not to cause ill health, but there are manifestations of discomfort, due to the change in the circulation and the cessation of the functional activities of the generative organs. Many increase in flesh and become more or less inactive, both physically and mentally. There may be functional disturbances of the heart and digestive organs and deranged secretions. The flushing of the face and hot flashes, due to vasomotor disturbances, are very annoying. Fullness of the head, occasional headaches and sleeplessness at night are sometimes noticed, and in some cases there is a slight loss of appetite, and with it a loss of weight. In some there is disturbance of the circulation, nervous excitement, restlessness and impaired memory from lack of concentration. These are common symptoms in healthy women under ordinary circumstances at this time in life.

The change in the sexual organs is a gradual breaking down and diminution in size until when the menopause is completed the uterus is no larger than that of a child, and the ovaries cor-

respond with it in size. With each ovulation, the ovaries have gradually deteriorated, and now no longer exert an influence over the animal economy. There is not as great a demand for a large blood supply, and the uterus soon shows the effect of the lowered nutrition by diminution in size. There is lowered nutrition of the external nerve centers, and the organic nerves which govern them, and to some extent the brain also withdraws its influence. With this change menstruation ends.

Certain diseases may keep up a modified menstruation, thus draining the nervous and nutritive systems; again, degeneration of the ovaries and uterus may cause suppression of the menses while the cerebro-spinal system is yet very active, and a disturbance of equilibrium with attendant ill symptoms follow.

Treatment is necessary to quiet mental disturbance and secure proper rest. Sedatives and tonics have their place. For the digestive disturbances subnitrate of bismuth in twenty-grain doses is often an efficient remedy. The spinal irritation is relieved by cupping, and by cold and hot douches alternating. Time is an effective cure, so alleviation of the disagreeable features is all that is necessary. When there are marked symptoms of plethora, with inactive kidneys and liver, small doses of calomel followed by a dose of saline water, or draughts of a natural cathartic water, are helps. Turkish baths and muscular exercise do good in some cases. The diet should consist of milk, eggs and vegetables; very little meat is to be taken, and the quantity of food must be limited; under-eat rather than over-eat. As there is a tendency to develop diseases of the nervous system at this time, it is of manifest importance to regulate all imperfections as far as possible.

When a woman is strong and healthy there is no reason for alarm if the menopause is delayed, but when the general health is impaired and the menopause extends beyond the usual time effort should be made to discover whether any local cause for it exists. Any tumor, a failure of the uterus to return to its normal size after labor, or old injuries, may keep up the menstrual flow. Scar tissue in the cervix, by keeping up irritation, may prevent the normal change. Liver, heart or kidney disease may prolong menstruation and give rise to increased hemorrhage about the time of the menopause. These conditions should all receive proper treatment, which, if successful, will relieve the increased or prolonged hemorrhage.

INFLAMMATION OF THE UTERUS AFTER THE MENOPAUSE.

This deserves special notice, because it is not only of frequent occurrence, but varies from that of youth and middle life in being more of a degeneration than inflammation, and only yields to most persistent local treatment. These cases of endometritis after the menopause usually follow endometritis before the menopause, or are kept up by displacements, old lacerations, or small tumors, which, even when removed, may leave an irritation behind that takes a long time to heal; in fact, the cure in all these cases requires patient and protracted treatment.

Particular attention must be given to diet and general tonics, and much relief is obtained from vaginal douches containing from two to three drams of powdered borax to the quart of water, or one dram of sulphate of zinc to the quart of water. If all the local treatment to which the physician may resort fails, there may arise the question of complete removal of the uterus by surgery.

ABDOMINAL DISPLACEMENT.

It must be observed that very frequently there develops in the aged a tendency to falling not only of the uterus, but also of the abdominal contents, which then push down the uterus before them. The cause of this is wrong use of corsets and predisposition to displacement. Bending over, as in reading, writing and the use of the sewing machine, actually produces this displacement for the time, but when the constriction is removed, or the normal position is again resumed, there is a return of the abdominal contents to their proper place. In old age, however, this elasticity of tissue is lost and the dislocation persists. Replacement is obtained by manipulation with the fingers and a position upon the back in which the hips are higher than any other part of the body. This replacement is retained by rest in bed and by an abdominal bandage. When improvement is noticed the patient may be allowed to sit up, the clothing about the waist being very loose. The knee-chest position should be practiced several times daily, and a few short rests taken in the reclining position; the bowels should be kept free; massage, electricity and tonic treatment are here of great benefit. Complete relief will be obtained by young women, but in the old this is seldom attained.

COMPLETE PROLAPSUS.

In aged women complete prolapsus, or falling of the womb, is also frequent. It comes from degeneration of the tissues of the pelvic cavity. This may be preceded by lacerations and inflammation during earlier years, or be found in those who develop displacements after the menopause. Sedentary habits and impaired nutrition are the chief predisposing causes, and constipation and delay in emptying the bladder are aids in bringing on the disease. It is often found in those who have been obliged to be a great deal upon their feet.

Treatment.—It is far easier to prevent prolapsus than to cure it. When the first symptoms of bearing down and of irritable bladder are noticed, astringent douches should be given, a teaspoonful of sulphate of zinc to the quart of hot water, or a tablespoonful of tannic acid to the quart of hot water. Later in the disease it is often necessary to use plegets of cotton medicated with glycerin and tannic acid—two teaspoons of tannic acid to a tablespoon of glycerin. These plegets must be of just the right size to give support and not irritate. Pessaries often answer remarkably well if properly fitted and give no pain or inconvenience by their presence. They should never be worn if the patient is at all conscious of their presence.

ENLARGED PELVIC VEINS.

The pelvic veins are especially prone to dilatation because they are without valves or support by fasciæ or tissues, and are under constant pressure when the woman is in the erect position. These enlarged veins cause pressure upon the pelvic tissues and nerves, and are thus a source of dull pain. This derangement of the circulation, if continued, will sooner or later result in disease of the ovaries, rectum, uterus and bladder. The causes are unsuitable occupation, tight clothing, excessive activity of the sexual function without satisfaction, lacerations, and a lack of return of the uterus after childbearing or miscarriage. Any condition that obstructs the return of the blood from the pelvis favors this condition.

Treatment.—Many of these cases can be greatly relieved by rest in bed with the hips elevated. Astringent douches, restoration of all lacerations, plegets medicated with tannic acid and glycerin, pessaries, all are useful. At night the pelvis should

be raised, and when on the side, Sims position should be taken, the upper knee being placed on the bed above the lower knee. Electricity is also valuable in these cases.

If women would consult the physician as soon as the earlier symptoms of pelvic disease present themselves, submit to the proper course of treatment, and follow instructions not only in the medicinal line, but with regard to rest as well, many months of suffering would be avoided, and healthy womanhood result.

DISEASES OF THE SKIN.

By R. E. McVey, M.D.

CHAPTER I.

ANATOMY.

A knowledge of the structure of the skin is very important to those who expect to understand the nature of its diseases.

The skin is divided into the outer or scarf skin and the inner or true skin. The scarf skin is divided into the horny and the mucous layers, which are for the protection of the true skin underneath. The true skin is a flexible and highly elastic tissue, a part of whose purpose is to defend the parts beneath from violence. It also is divided into two layers, the papillary and the reticular. The papillary layer is the superficial or outer of these two layers and contains the nerves of sensation and the small blood vessels from which the scarf skin draws its nutrition. The reticular layer is composed of connective tissue and contains the sebaceous and sweat glands and the hair follicles. The openings of these glands and follicles extend upward or outward through the other layers to the surface of the scarf skin.

The skin varies in thickness, being thinnest upon the eyelids, the prepuce and the inner surface of the greater labia, and thickest upon the back, soles and palms. The subdermic tissue (tissue found beneath the true skin) is composed of connective tissue so arranged as to form a network, enclosing fat cells, which have thin elastic capsules or sheaths. These fat cells are separated, one from another, by the connective tissue fibers and are furnished with a capillary plexus, or network, having an afferent artery and two or three efferent veins. When abundant, this adipose structure beneath the skin gives to the features of young people their symmetrical and healthful appearance. Connective tissue is also found in the corium, or true skin, but to only a limited extent.

The sebaceous or oil glands pour out a secretion for the

purpose of keeping the skin moist, giving to the hair its oily and glossy appearance, and protecting the skin against the absorption of excessive amounts of fluids and moisture, which otherwise might reach the circulation.

The sweat glands give off perspiration, and daily pour out about a quart of watery fluid containing some two per cent of solids, chiefly chloride of sodium, some fat, some cholesterine, urea carbonates, phosphates and organic acids. Sweating is probably more or less under nerve control and is the result of some stimulus acting upon the surface of the skin and reflected to a spinal center.

The skin is abundantly supplied with blood vessels, there being two distinct, parallel, horizontal sets; one in the true skin just beneath the papillæ, which receive nourishment from it through their vascular loops; the other below, in the connective tissue of the reticular layer, among the fat and sweat coils.

The muscles of the skin are of both varieties, the striated and the smooth. The striated are found only in the face, neck, chin, lips, nose and eyebrows. The smooth muscles are found in connection with the hair follicles and sebaceous glands and are arranged in bundles. The hair muscles (*arrectores pilorum*) spring from the papillary layer and pass to their insertion in the middle of the hair follicles to which they are fixed or joined. These muscles are surrounded and crossed by a network of elastic fibers through which their action is transmitted. They are very abundant upon the scalp and their contraction and movement are favored by their lying in lymph spaces. Their general contraction over the surface of the body produces what is known as goose skin (*cutis anserina*).

These erector hair muscles also regulate the secretions and excretions of the skin, and furnish a protection against alterations of temperature, by causing contraction and thickening of the skin to prevent the action of cold, dampness and other deleterious effects.

Pigmentation of the skin depends upon a slight staining in the lower layer of cells in the rete (reticular layer). The true pigment is known as melanin and is found in fine granules, deposited in the cells to which we have just referred. Its color is modified by the vascularity of the skin and the coloring matter of the blood. The sun has much to do with its color and quantity. Thus, in cold climates it is of light color and shades into deeper

and deeper hues as we go toward the equator, until a deep black is reached, as found in the negro. The inference was the existence of some relation between pigment and the rays of the sun, and it has been proven that pigment is protection against heat rays.

DEFINITIONS.

The following terms are used in discussing skin diseases and a little study of them will greatly aid in understanding their diagnosis.

A red spot upon the skin, due to a superabundant supply of blood in that part, is called erythema, and the oversupply causing it, and resulting in distention of the arteries and veins, is called hyperemia.

A papule is a pimple, a small, solid elevation, not often larger than a split pea and located upon the surface of the skin. When deep seated it is called a tubercle. Such solid masses larger than a tubercle, but smaller than a cherry, are called nodules. If larger than cherries they are called tumors.

Vesicles are small, cone-shaped elevations containing straw colored fluid. Blebs or bullæ are large vesicles, such as are met in cases of ivy poisoning.

Pustules are small elevations containing pus or matter. A vesicle in its later stages may become a pustule.

An eruption consisting of pustules is called pustular, of papules papular, and of mere dots or points punctate.

Wheals are variously sized and shaped swellings, whitish or reddish in color, usually pale at the center, and appear and disappear quickly, as the lesions produced by mosquito bites, the sting of a nettle, etc.

Squamæ are scales of the epidermis or scarf skin. They are sometimes called epithelial scales. Desquamation is the term used to denote a natural casting off or loss of these scales.

Crusts or scabs are hard masses of dried pus, or other exuded fluids, and dead skin.

Excoriations are portions of the skin denuded of epidermis by chafing, rubbing, scratching, etc.

Ulceration is destruction of a portion of the skin by disease through suppuration—the formation of pus.

Fissure is a crack in the skin, such as occurs in cracked lips or chapped hands. Cicatrix is a scar. Stains are discolorations left by skin disease and may be either transitory or permanent.

A lesion is a hurt, injury or sore. A secondary lesion is one resulting from another or primary lesion through accidental or natural change, modification or termination.

Scales, crusts, excoriations, fissures, ulcers, scars and stains are all included in the general term secondary lesions.

It is a mistake to suppose that all skin diseases are results of bad or impure blood, or that it will not do to heal them too quickly. Like other disorders of the body, they should be cured as quickly as possible.

CHAPTER II.

DISEASES OF THE SEBACEOUS GLANDS.

The sebaceous or oil glands secrete sebum, which consists of water, cast-off epithelial structures, fatty and granular matter, alkaline and earthy phosphates, chlorides, palmitin, olein and cholesterine.

There are three sets of sebaceous glands situated within the true skin.

Some occur as appendages of the hair system and are designated as glands of the hair follicles. The smaller set are appendages of the long hairs. The larger set are mostly found over those regions of the body covered with lanugo hairs. The third, although a variety of hair follicles, occur quite independently of the hairs and are known as the *glandulæ odoriferæ* of the genitals in both sexes.

The Meibomian glands are situated about the eyelids and are liable to inflammation, injuries and pus formations, such as sties, for which all the treatment needed is an opening up of the glands affected.

The *arrectores pilorum* are follicular muscles, which, by their extension and contraction, undoubtedly aid in forcing out the sebaceous matter from the ducts.

When the secretions are not eliminated, but collect in the ducts, the disease is known as comedo.

When little cysts form in the ducts and contain a little white, hard, seed-like substance it is known as milium.

When cysts form in the ducts and grow to a large size, whether their contents be hard, soft, cheesy or fluid, they are called steatoma.

When the secretions are increased the disease is known as seborrhea.

When the secretions back up at the gland outlets and decompose the condition is known as acne.

When the secretions are diminished the disease is called asteatosis.

COMEDO.

(Black Heads. Flesh Worms.)

The comedo (dermodex folliculum) is a small parasite which is found in the sebaceous glands. Its favorite sites are the nose, chin, forehead, cheeks, etc., but it has also been observed in many other parts of the body.

The parasite rests with the head downward in the follicle and is easily pressed out from the large glands of the nose by a curette, or by pinching them between the thumb nails. It is not known to have any injurious effect, but its presence is, by some, considered the first stage of acne. No treatment is needed except to press them out and paint the parts with fluid extract of ergot, or a saturated solution of boric acid.

MILIUM.

(Grutum.)

Milia are small, pearly, whitish or yellowish globular bodies lying just below the surface of the skin. They are not painful, are pin head in size and most common in the face, just below the eyes, but are also found on other parts of the skin. Each of these little bodies is an abnormal development of a sebaceous cyst whose outlet became clogged so that its secretion was retained and became dry and hard.

Treatment.—Electrolysis is probably the best, but if that is not convenient break a coarse needle, sharpen the shaft to a chisel-shaped edge and with it prick each globule and press out the contents. Should they reappear repeat the treatment and touch each cavity with tincture of iodine.

STEATOMA.

(Wens.)

A wen has sometimes been called a large milium. Both affections are probably due to the same cause, but they differ much in character and development. The contents of a wen may be hard, soft, cheesy or fluid. It is usually found upon the face, scalp or back, and is movable and painless.

Treatment.—A long incision is made and the mass dissected out, care being taken to remove the enveloping sac, for if that be left the growth will be very sure to return.

SEBORRHEA.

(Dandruff.)

Seborrhea is an affection of the sebaceous glands, characterized by an increased flow of their secretion. It may be divided into two classes, that of the hairy parts and that of the smooth parts of the body. Seborrhea of the hairy parts is divided into four varieties: dry, concrete, oily and circinate.

Dry seborrhea is really an excessive amount of epithelium of the scalp and is not properly a disease of the sebaceous glands, but of the epithelium of the scarf skin. It is often called dry skin.

Concrete seborrhea is composed of greasy crusts formed from sebum and epithelial scales. The crust varies from a grayish white to a deep brown, and is adherent to the scalp. Under the crust is a reddish moist surface. This form of seborrhea is found upon the scalp in the region of the temples, and may pass a little below the hairy border of the temples.

Oily seborrhea, also known as seborrhea oleosa, greasy seborrhea, or oily skin, is a mixed form of seborrhea and shows itself upon the scalp and at the same time upon the face by a layer of oily, greasy matter in greater or less abundance. The skin is more or less red and congested.

Circinate seborrhea, eczema of the scalp, is probably a parasitic disease and should be classified as an eczema. It is characterized by the appearance of greasy scales or crusts arranged in figure-of-eight forms, resting upon a red base, sometimes dry and sometimes moist. There is usually found an oozing or weeping surface from the scabage raised. Upon the top of the scalp there is more or less alopecia or baldness. This form of eruption is also found upon the trunk, between the shoulders, and upon the sternum. When found upon the body it is called seborrhea corporis. It is also known as *lichen annulatus serpiginosus*.

Baldness is observed in all the varieties of seborrhea. It does not originate at the same time as the disease, but follows it after a longer or shorter period.

In the first two forms, which are the kinds most frequently met, two stages may be observed. In the first stage there is more or less scaling, and the hairs are dry, thin and gradually fall out—the duration of the condition varying, according to the subject, from one to ten years.

In the second stage the hair falls rapidly. It becomes more

and more thin and fine, until there remains only a downy growth, which in turn also vanishes.

These two forms affect men between the ages of twenty and thirty-five years. Sometimes this form of baldness is seen in women also. The disease sometimes attacks the eyelashes and brows, producing alopecia of the lids and brows. Seborrhea of the scalp may be complicated by various other affections.

Cause of seborrhea: General debility, anemia, chlorosis, dyspepsia and loss of tone in the glands and skin. It may be parasitic and contagious, but the parasite has not yet been discovered.

Diagnosis.—Seborrhea of the scalp may be confused with eczema and psoriasis. Upon the face it may be confounded with lupus erythematosus and eczema, and upon the trunk with psoriasis and ring worm, but eczema, psoriasis and erythematosus are diseases in which there are more or less inflammatory symptoms, such as thickening, infiltration and redness. These do not occur in seborrhea.

All the types are curable and those upon the non-hairy portions of the body readily so. Those upon the hairy parts are obstinate. In cases of seborrhea of the scalp, which have been of long standing or neglected, attended with loss of hair, the loss may be more or less permanent.

Treatment.—Various tonics are recommended, such as iron, quinine, strychnia, cod liver oil, arsenic and maltine in its various forms. Shampoo with castile soap and hot soft water. When there are scales and crust formations the tincture of green soap should be used. Previous to shampooing, the scalp should be soaked with olive oil. The head should be kept clean. The treatment may be repeated every day, or every other day, according to the rapidity of the formation of scales or crusts. The affected parts may be anointed with petroleum ointment, or bathed with a lotion composed of ten drops of glycerin to one ounce of dilute alcohol. Water may be used in place of the alcohol, but is not as good.

Any of the following ointments are useful: One dram sulphur to one ounce of lard; 26 grains ammoniated mercury to an ounce lard; 30 grains salicylic acid to an ounce lard; 26 grains resorcin to an ounce lard. Vaseline is preferred to lard, by some, for use in these ointments, but its medicinal properties are not as

valuable. The following lotion is also used with good results: Resorcin 1 dram, castor oil 20 drops, alcohol 4 ounces.

Do not use a stiff brush or a fine comb on scalps affected with this disease to remove dandruff, for they will only make the trouble worse. Only a very soft brush should be applied.

ACNE VULGARIS.

Acne vulgaris is a chronic, inflammatory affection of the sebaceous glands, caused by decomposition, or a backing up of the secretion of the glands at their outlets. The disease makes its appearance about the fifteenth year, when the development or changes in the glands in general take place. In such persons we find more or less general debility, accompanied by dyspeptic symptoms and irregular habits of the bowels.

The loss of tone in the muscular fibers of the glands of the skin is an effect from the general debility of the system. This general muscular debility is probably associated with a modified nervous tone through which the secretion in the glands undergoes chemical changes which give rise to hyperemia and inflammation in the follicles.

When the inflammation in the glands is intense and red it is designated as *acne punctata*.

When the eruption is a little more elevated we call it *acne papulosa*.

If the base of the eruption is red and hard it is called *acne indurata*.

If pus forms in the center of the papule it is designated as *acne pustulosa*.

If the lesion disappears, leaving a pit-like depression, it is known as *acne atrophica*.

When there is connective tissue, new growth, it is known as *acne hypertrophica*.

In scrofulous or cachectic individuals, where there are dermic abscesses of a cold and sluggish character, it is called *acne cachecticorum*.

Temporary acne is produced by certain medicines, such as the bromides, the iodines and the external use of tar.

Acne is usually an obstinate disease but curable. Sometimes it yields readily to treatment, but at other times is very rebellious. Each case must be studied and treated by itself, as the indications demand. It is most common in persons of light complexion.

For the general debility, bitter tonics, alkalies, acids, pepsin and saline and vegetable laxatives are prescribed, as their use is indicated by the various alterations in the digestive secretions. A very good remedy is:

Fluid extract cascara sagrada.....two drams
Tincture nux vomica.....two drams
Tincture gentian comp.....three and one-half ounces
Take one teaspoonful three times a day.

Equal parts of sulphate of iron and carbonate of potassium, powdered and well mixed, form a good remedy. It should be taken in two-grain doses three times daily.

For anemic patients preparations of iron are recommended; and for scrofulous and debilitated subjects cod-liver oil is of great value. Where there is a tendency to the pustular form of the eruption, Calx sulphurata in pill form, one-tenth of a grain four times a day, should be taken.

Females who have uterine disturbances in connection with this disease may be given fifteen drops of the fluid extract of ergot three times a day.

In the slow, sluggish, papular form arsenic is invaluable. Probably arseniated soda, one-twentieth of a grain three times daily, is the best. Washing the parts with warm water and soap, then rinsing and sponging for several minutes with hot water, is very important. In sluggish and non-irritable cases green soap should be used in place of ordinary toilet soap. If ointments are used they should be rubbed in thoroughly.

The following stock prescriptions are excellent:

Sulphur (precip.).....one dram
Benzoinated lard.....two drams
Lanolin.....two drams

If a lotion is preferred, use

Sulphur (precip.).....one and one-half drams
Pulverized gum tragacanth.....twenty grains
Spirits camphor.....two drams
Lime water.....three and one-half ounces

Or Sulphur (precip.).....one and one-half drams
Etherfour drams
Alcohol.....three and one-half ounces

Resorcin, 60 grains to an ounce of distilled water, is sometimes very good. All external applications should be used twice a day.

PSORIASIS.

Psoriasis is a chronic inflammatory affection of the skin and is distinguished by red, roundish patches covered by silvery scales. The disease is usually found upon the scalp, elbows and extensor muscles. The affection begins as a small papule and enlarges at the margins. According to the development of the papules the disease is known as psoriasis punctata, psoriasis guttata, psoriasis nummularis, psoriasis circinata and psoriasis gyrata, but we will here consider it under the general term psoriasis.

It is not a contagious disease and is more common in winter than in summer. Sometimes it disappears altogether in warm weather, only to come again when winter returns. Various theories have been advanced as to its cause. Some eminent authorities believe it to be of microbic origin. If so, the microbe does not enter from without, but finds its way into the capillaries of the papillary layer through the blood. This view is strengthened by the fact that microbes have been found in the scales.

Some think it a hyperplasia of the cells of the rete, the overproduction of epithelial cells setting up inflammation. Still others believe that it is due to a functional weakness of the nervous centers regulating the nutrition of the skin and that the eruption depends upon local irritation; that the hat may have something to do with its presence upon the scalp; that its presence upon the elbows and knees and the surface of the extensor muscles is the result of some form of irritation, etc.

A strong diagnostic feature of psoriasis is the absence of discharge. The skin is dry through the whole course of the disease. The affection that most resembles it is eczema squamosum, but the eczema patches are seldom well defined, while those of psoriasis are. In psoriasis the scales are in a single layer, while those of eczema are in an adherent crust. The eczema crusts are composed not of scales only, but of dried exudation mixed with scales, and if these crusts are removed forcibly, an exudation of serum is more likely to ensue than one of blood, and bright red points are not seen in the exposed surface.

In lichen planus the patches resemble those of psoriasis, but in lichen planus they are common on the front of the leg, the scales are not in crusts, the infiltration is greater as a rule, the color of the eruption is a violet red, and the papules are flat and angular.

Psoriasis also differs from seborrhea of the scalp, in that the latter is more diffuse, without redness and infiltration, and has greasy scales of a dirty gray or brownish color, while the scales of psoriasis are dry and whitish or of a mother-of-pearl color.

Treatment.—Arsenic is an old remedy for the sluggish and chronic forms of this disease. It is given in the form of Fowler's solution, two to five drops three times a day. Arsenic should never be given alone. If we wish to give two drops of the solution three times a day the best way is to put one dram of it into four ounces of water and give a teaspoonful.

Potassium iodide is a valuable remedy for this disease where there is a specific taint in ancestors. Salacine has given good results and salicylate of soda is good, if we take the view of it being of microbic origin. Iron, quinine, strychnia and cod-liver oil are recommended if there be general debility. The scales may ordinarily be removed by alkaline baths, or by washing in hot water and soap, after which either of the following external remedies may be applied.

Vaseline	one ounce
Chrysarobin	one-half dram
Salicylic acid.....	one-half dram
Resorcin	one dram

Or Ichthyol	three drams
Bismuth subnitrate.....	one dram
Vaseline.....	one and one-half ounces

A 25 per cent solution of resorcin is a valuable lotion for this purpose.

The patient should be kept under observation and the treatment varied according to the intensity of the inflammation. The use of chrysarobin is likely to stain the clothes, and, when used about the head, to produce irritation of the eyes; hence, it is better to confine the treatment to salicylic acid or pyrogalic acid, using it in the prescription instead of chrysarobin, but the latter is the best remedy aside from these qualities. The disease is very obstinate, and, under any form of treatment, will return from time to time.

LICHEN PLANUS.

Lichen planus is an inflammatory affection of the skin. It appears in red or violet colored, flat, angular papules, and is usually found on the front surface of the wrists, the forearms, the lower part of the abdomen, the back, neck, lower extremities, genitals, sides of the trunk, palms and soles. It also occurs inside the cheeks and upon the scalp. The papules run an unchangeable course, never contain any fluid, and may be separate and distinct or may run together.

This disease does its work very slowly, and may persist without change for many months or years. The eruption spreads slowly, but progressively; sometimes there is slight inflammation, and sometimes changes which seem to coincide with mental shocks and over-fatigue, or some disturbance of the nervous system. Left to itself, lichen planus may undergo spontaneous cure, but usually it lingers long. The papules undergo a gradual decline and their centers become depressed and colored, there being considerable coloring matter left after the eruption has disappeared.

It may be distinguished from papulary eczema by the angularity and flatness of its lesions, their peculiar purplish red color, and the absence of minute blood crusts. From psoriasis it differs in possessing no tendency to the formation of gradually increasing circular patches, nor to the accumulation of epidermic scales. Unless his nerves are very badly disordered, a person afflicted with lichen planus will always recover. He should be informed as to the severity of the disease and its variable course. Beyond the annoyance from the itching, and the unsightly appearance of the eruption on the exposed parts, one need expect no serious discomfort, for in bad cases the general health suffers but slightly.

Treatment.—Arsenic is the sovereign remedy in this disease, and should be given in water, in the form of Fowler's solution. To one dram of the solution add four ounces of distilled water, shake thoroughly, and take two teaspoonfuls three times a day, after meals. The best local remedy is the following wash which should be used twice a day: Zinc sulphate one-half dram, sulphuret of potassium one-half dram and rose water four ounces.

URTICARIA.

(Nettle Rash. Hives.)

Urticaria, from the Latin word for nettle, is an inflammatory affection of the skin, characterized by firm, smooth, round, oval or irregular shaped wheals, moderately elevated, having reddened bases and flattened tops, which, as the wheals develop, usually fade to whitish centers. Each wheal is small at first, but rapidly enlarges to an area from one-fourth to one inch in diameter, and has such itching, pricking or stinging sensations as to generally lead to severe scratching, but this relief is only temporary, is soon followed by greater suffering and, sometimes, by the formation of new lesions as troublesome as the first. It is thought that the disorder is of nervous origin, for the wheals come and go, lasting from an hour or two to a day or even longer, then disappearing, leaving no scales or traces of any kind. The health of the gouty is often improved by an attack, but one having had hives once is more likely to have them again.

The occurrence of urticaria implies a peculiar predisposition of the individual to the disease, and where this is well marked the attacks may be brought on by almost any form of friction of the skin, as the chafing of coarse garments on the knees or other parts. It may also be induced by the action of heat and cold. Among its internal causes are emotional excitement, hysteria, digestive disturbances and certain articles of food, such as fish, crabs, lobsters, clams, oysters, pork, mutton, cheese, and sometimes eggs, cucumbers and strawberries. Hives in children is probably due to the same cause.

Treatment.—Salicylate of soda has a valuable effect upon the disease when associated with rheumatic conditions. From five to ten grains may be given every four hours to adults, and in smaller doses to children. When accompanied by irritation of the intestines, salts or other saline cathartics should be given. Where there is much itching, atropine may be given in doses of one one-hundred and fiftieth of a grain once in four hours. It first produces constriction of the blood vessels, but its secondary effect is that of dilatation, thus relieving the spasm of the muscles of the skin. Through a similar action hot water or a Turkish bath is sometimes successfully employed. Vinegar and water, lemon juice, diluted acetic acid, diluted alcohol, or peppermint in alcohol, three grains of the former to an ounce of the latter, any of them,

may be applied externally. Dusting powders of starch and zinc oxide applied after an alkaline bath are useful. Those predisposed to the disease should guard against those articles of food that are likely to arouse it.

HERPES SIMPLEX.

(Fever Blisters.)

Herpes simplex is an acute, noncontagious, benign affection of the skin, occurring in one or more groups of vesicles on a reddened base, and usually accompanies some other disease.

There are two varieties, herpes facialis and herpes progenerialis. The eruption is preceded by malaise or some constitutional disorder. The sense of chilliness or shivers precedes, and within a few hours a papular eruption develops which is readily transformed into vesicles. These are from pin head to pea size and stand closely together in groups, five or six forming a patch in some cases, but usually not more than one or two. The eruption is most often found around the mouth, particularly upon the lips near the junction of the skin and mucous membrane. When so located it is called herpes labialis; when on the side of the nose, herpes nasalis; when upon the genitals, herpes progenerialis, and is divided into herpes preputialis and herpes vulvæ.

Herpes simplex, or fever blisters, usually disappear in a few days, but may remain two weeks. Anointing the parts with camphorated cold cream relieves the burning. Applications of spirits of camphor or any similar lotion is also useful in hastening the termination of the trouble. Subnitrate of bismuth rubbed upon the eruption is excellent.

Herpes progenerialis is common in the uncleanly after intercourse, occurs upon the genitals, is more frequent in men than in women, and usually follows some disordered condition of the system. It is sometimes preceded by chancroid or gonorrhea, coming out two or three weeks after the sore has been healed or the gonorrhea cured, and recurring quite regularly every few weeks or months thereafter, especially if the organs be excited as by coitus or the use of the catheter, but it may follow any of the causes that produce herpes upon the lips. It is probably a result of disordered nerves, but this has not been proven. Its diagnosis is important because it is often mistaken for chancroid. At the beginning no one should make this mistake, for this herpes

then very closely resembles the other form in which the fever blisters or cold sores appear on the lips and is preceded by similar symptoms—itching or burning in the swollen spots that become the sites of the blisters which nearly always begin as a cluster of small vesicles; but after two or three days pus forms in the sores and it may be that time alone can then positively decide, although chancroid usually begins as a single vesicle and about four days after exposure through sexual contact. If in three or four days more the blisters heal, the trouble was herpes, for chancroid spreads through self-inoculation, has greater destructive tendencies and recovers more slowly. Herpes could hardly be mistaken for the initial lesion of syphilis, since the latter almost always is a single small sore which matures slowly, hardens and secretes very little serous fluid, and is accompanied by enlargement of the glands in the groins.

Treatment.—Proper hygiene of the parts; strict cleanliness; the separation of the opposing surfaces by slightly astringent and aseptic powders; regulation of the sexual habits, and, in men, sometimes circumcision.

HERPES ZOSTER.

(Shingles.)

Herpes zoster is an acute, inflammatory disease in which the vesicles are tense and firm and situated upon inflammatory bases. The vesicles are closely pushed together and grouped into patches. They are at first filled with a clear fluid, which may soon take on a milky or yellowish appearance from the production of pus corpuscles. The lesions run together, bullæ are formed, and large patches of skin become elevated. As the groups may not all come out at once, a few are likely to be seen at first. New ones begin to come as the old ones begin to get dry. By the end of the second week all the lesions are covered with a dry, brown crust. Pain is characteristic of zoster. It precedes the eruptive spots and is of a neuralgic character.

The typical zoster occupies one side of the trunk, following the course of the spinal nerves. The pain between the ribs may resemble pleurisy, before the eruption appears. It may be attended with mild fever, and by some has been thought to be infectious. It usually disappears in from two to four weeks, but if in the neighborhood of the eyes they may suffer permanent damage.

Treatment.—Give tonics. Quinine is good. The following powder may be applied to the parts:

Zinc oxide.....	four drams
Starch	four drams
Pulverized camphor.....	one ounce

The following ointment is better to relieve pain:

Zinc oxide.....	four drams
Opium	one dram
Lard or vaseline.....	one ounce

MILIARIA RUBRA.

(Prickly Heat.)

Miliaria rubra is an affection of the sweat glands, occurring in the heated term of summer. In children it is known as red gum. The eruption makes its appearance after unusual exertion or a hearty meal. In children it is a result of too much clothing or overfeeding. Any portion of the surface of the body is liable to be attacked. An examination of the affected parts will show them to be studded with countless minute vesicles from the size of the point of a pin to that of a pinhead, accompanied by intense itching. The vesicles are always discreet, that is they do not run into one another, and do not rupture spontaneously as in eczema. There is never any general discharge. The general health of the patient is not affected by this disorder.

While the rash is out, a glass of wine or a cup of tea brings on a sudden and violent attack of itching. The main changes affect the epidermis. Scattered through the reticular layer are oval or circular cyst-like spaces—sections of dilated sweat ducts, the contents of which may be wholly fluid, or contain cellular elements in considerable numbers. Some have tried to explain this disorder on the theory that by absorbing sweat the cells of the horny layer of the skin are made to swell and so press upon the mouths of the sweat ducts as to tightly close them at a time when perspiration has just ceased, and that any further secretion of sweat, while this condition lasts, must result in accumulations of liquid in the obstructed ducts and, by their dilatation, cause the tingling pain characteristic of prickly heat; also that during this period of obstruction anything which causes sweating brings on the attack.

The disease bears a close resemblance to eczema, but in the

latter disease the skin over the whole patch is affected uniformly, while in prickly heat the eruption is in patches and the skin is not uniformly red over the whole surface. Eczema is persistent; but prickly heat is only temporary, is a rash and occurs only in hot weather.

Treatment.—The bowels should be kept free and regular, and the patient must restrain himself to a mild diet. Violent exercise and heavy clothing should be avoided. A bath should be taken daily and the affected parts washed in a calamine lotion, or in a saturated solution of boric acid. Alcohol and water, or vinegar and water, will often give relief, which will be increased by following the wash with a cooling dusting powder composed of equal parts of starch, boric acid, talc and zinc oxide, all pulverized. The patient should also take saline remedies to stimulate the kidneys. The acetate and nitrate of potash, an equal part of each, form a good combination for this purpose, and should be taken in three-grain doses three times a day.

VERRUCA.

(Warts.)

Warts are morbid growths, varying much in size, shape and character.

They are found upon people of all ages, occur chiefly from contagion, and are composed of a prolongation of connective tissue, which contains a blood vessel and is covered by thickened skin.

The common wart, *verruca vulgaris*, is generally found upon the hands, feet, ears and face, but may be found upon any part of the body. This form is most frequent in children. It may occur singly, or the fingers may be covered with them. They are from pinhead to pea size, and are hard, conical elevations with a flattened top and composed of the horny tissue of the skin. Their surface is either smooth or rough and may be made up of closely crowded projections. At first they are of the same color as the skin, but become darker with time and exposure. As a rule these warts appear slowly, but they may come on at once in considerable numbers. They may remain a long time, usually months or years, but in many cases disappear of their own accord, or from the action of some irritating drug.

There is a form of warts called *verruca plana*, so named be-

cause they resemble lichen planus. They are smaller than common warts, and occur in greater numbers. They are found not only upon the hands, but upon the cheeks and other parts of the face. They are caused by elongations of the papillæ, and hypertrophy of all the layers of the skin.

Another variety, *verruca senilis*, is met principally upon those of middle life to old age, and is more common in men than in women. It is favored by the gradual degeneration of the skin tissues in old people, by all irritating agencies, and by uncleanness. It is found upon the back, arms, face, neck and trunk: is raised above the surface of the skin; is round or irregular in shape; and may be of the same color as the skin, or of a greenish yellow, brown or black. It may cause much annoyance by itching, and often makes a rapid growth and ends in skin cancer, for which reason it should be removed if any signs of increased growth appear. From the fact that this wart is often of a fatty consistency, it has sometimes been classed as a seborrhea.

Verruca filiformis is a form found upon the eyelids and chest in people who have attained adult age. In these warts the papillæ do not seem to be involved, as the projection is made up of connective tissue from the lower layers of the skin. They usually occur singly, and through the wart is a blood vessel.

Verruca perstans is a persistent wart which remains unchanged.

Verruca acuminata is a venereal wart. It is a soft, moist, papilla form growth upon the smooth skin. They are the most common in the sulcus and upon the penis, labia and perineum.

Treatment.—Upon common warts, such as are seen upon children, nitric acid, glacial acetic acid, and acid nitrate of mercury may be used with good effect. Any of these acids should be applied with the point of a small stick, the surrounding skin being protected by a layer of collodion or some other film painted on for that purpose. Salicylic acid is one of the best remedies, as it softens the horny layer without causing irritation. It should be used in the proportion of one dram of the acid to one ounce of collodion, and be applied with a camelshair pencil twice daily for three days, then the wart should be carefully soaked in warm water and rubbed with pumice stone or sand soap.

The acuminate form may be removed by keeping them dry and clean. The salicylic acid preparation may also be used, and,

in very obstinate cases, glacial acetic acid, but this remedy should be used in very small quantity and carefully.

Filiform warts should be clipped off. Senile warts should be thoroughly scraped, and their bases touched with nitrate of silver, or other caustic. Salicylic acid may be used, as for the other forms. Electro-cautery may also be used, but electrolysis is better.

Sulphate of magnesia, given internally in small doses for a considerable time, is said to remove common warts, but experience does not sustain the expectations of those who rely upon its efficiency. Better use external remedies only.

ECZEMA.

(Tetter. Salt Rheum.)

Eczema means to boil out, and is the name applied to a certain acute, subacute or chronic inflammatory disease of the skin, characterized at first by erythema, papules, vesicles, or pustules, or a combination of these lesions, with a variable amount of infiltration and thickening of the skin, terminating either in discharge, the formation of crusts, in absorption, or in scaling, and accompanied by more or less intense itching.

The disease is classified in several varieties, which are known by the kind of lesions present, or, in cases where there are more than one kind of lesions, by the principal kind. The principal varieties are as follows:

1. *Erythematous Eczema*, beginning with an irregular outline or hyperemic spot and more or less itching or burning. It may be limited to a certain region of the body, or be more or less generally spread over the surface. When fully developed the skin is harsh and dry, thickened and infiltrated and, usually, slightly scaly, with a tendency to oozing patches. Scratch marks may usually be seen scattered over the affected surface. It is most common upon the face, but is frequently found upon other parts. It is very likely to become chronic, in which case it is called *eczema squamosum*.

2. *Eczema Papulosum* is characterized by numbers of distinct, closely crowded, reddish, pinhead size, sharp or rounded papules (pimples), and was formerly known as lichen simplex. Vesicles and vesico-papules are often intermingled. It is most common upon the extremities. There is intense itching, and the patient can hardly refrain from scratching. The lesions tend

sooner or later to disappear, but are usually replaced by others. The disease persists for weeks or months. In places where it is closely crowded a solid, thickened, scaly covering of eruption may result in *eczema squamosum*.

3. *Eczema vesiculosum*, or the vesicular form, appears on one or several regions as diffused, inflammatory, reddened patches with closely crowded pinpoint to pinhead size vesicles, which tend to run together and form a solid sheet of eruption. The vesicles soon mature and burst, the discharge drying to a large honey-comb-like crust. The oozing is more or less continuous. The crusts may be cast off, to be followed quickly by another crop of vesicles. This form of the disease is usually chronic. In infants it is called milk crusts.

4. *Eczema pustulosum* has its site upon the face and scalp, especially in the young and those who are ill-nourished. There is a marked tendency to a crusting of the lesions, the discharge drying in thick, brownish, yellowish or greenish crusts. In this form of eruption there are germs which cause pus formations.

5. *Eczema fissum* is a form in which a tendency to fissuring or cracking of the skin is an important symptom. This tendency to cracking varies considerably, according to the state of the weather, often disappearing in summer to return in winter. The disease is very common upon the hands and fingers, in which location it is known as chapped hands.

6. *Eczema seborrhoicum* is an inflammation resembling both eczema and seborrhea. It is probably caused by a parasitic germ. This form occurs in sharply defined, rounded or irregular patches, and partakes of the nature of seborrhea, psoriasis and eczema, but most especially of seborrhea. There is not often any fever with it. The eczematous eruption or patches merge gradually and imperceptibly into the surrounding healthy skin. The disease is worse in cold, windy weather, and may be due to constitutional or local causes or to both. The constitutional causes are gout, rheumatism, indigestion, general debility, nervous exhaustion, cutting teeth and scrofula; and the local causes are heat and cold, sharp, biting winds, excessive use of water, strong soaps, chemical irritants and scratching.

7. *Eczema rubrum* is characterized by a red, raw-looking, weeping or oozing surface, attended by more or less inflammatory

thickening, infiltration and swelling, the exudation consisting of serum, sometimes bloody, which dries into thick, yellowish, or reddish brown crusts. It is an important form, developing from the vesicular, pustular or other primary form. It is chronic, and varies in intensity from time to time.

In appearance eczema resembles psoriasis, seborrhea, sycosis, itch and ring-worm. But psoriasis occurs in variously sized, rounded or sharply defined patches, usually scattered irregularly over the general surface of the body, with an especial fondness for the elbows and knees. These patches are covered over with whitish silvery scales, and are always dry, and the itching is usually slight. Eczema on the contrary is often localized and appears as diffused patches, merging imperceptibly into the sound skin, and there is itching, accompanied by more or less oozing.

The difference in the symptoms of seborrhea and eczema is that seborrhea of the scalp is commonly over the whole region, and is free from inflammation, the scales are of a greasy character, and the itching is slight; but in eczema of the scalp the parts are seldom entirely covered, inflammatory symptoms are usually prominent, the scales are dry, there is generally severe itching, and, at times, the serous or gummy oozing characteristic of this disease.

Itch differs from eczema in its distribution, and by the burrows and the absence of all tendency to patch formation; then, too, itch is contagious and eczema is not.

Sycosis differs from eczema in these respects: Sycosis is limited to the hair region of the face, is distinctly a follicular inflammation, and is rarely very itchy, while eczema is diffused, involving other parts of the face, and is so itchy as to make itching its most prominent symptom. It also appears upon the lips, scrotum and legs. When accompanied by a swollen condition of the veins, a cure is effected only by a long and persistent course of treatment.

Eczema of the scrotum appears as a papular eruption, but is not a usual form of eczema. It gives the scrotum a raw appearance, as though the skin had been scraped off, with a sticky discharge.

In eczema of the arms the skin is cracked. Eczema is curable and does not leave scars, but its duration is indefinite. The chronic form may continue for years.

Treatment.—Fresh air, exercise, regular habits, a plain, nutritious diet, abstention from pork, salted meats, acid fruits, pastry, sauces, pickles, condiments; excess of coffee and tea, beer, wine and other stimulants are forbidden. Soap and water is to be avoided as much as possible in the acute forms, but in the chronic and sluggish forms it may have a medicinal value. For chapped hands wash in a thin mush of wheat bran and water, prepared a few hours before using, rub them over the fire until thoroughly dry and draw on kid or thin leather gloves before retiring at night. In the acute stage black wash and oxide of zinc ointment may be used conjointly, the wash being thoroughly dabbed on and allowed to dry, then the parts gently smeared with the ointment.

BLACK WASH.

Calomel	1½ drams
Mucilage tragacanth	1 ounce
Lime water	8 ounces

Fowler's solution	2 drams
Bitter wine of iron	4 ounces

Mix 30 drops in water and take three times a day, after meals.

OXIDE OF ZINC OINTMENT.

Oxide of Zinc	1½ drams
Rose water	½ ounce
Vaseline ointment	½ ounce

Or use: Potas. iodide	3 drams
Distilled water	4 ounces

FOR ECZEMA OF THE SCALP.

Salicylic acid	20 grains
Zinc oxide	2 drams
Vaseline	1 ounce

Or, Boric acid	2 drams
Vaseline	1 ounce
Mix well and rub on the head.	

FOR VESICULAR ECZEMA.

Zinc oxide	1 ounce
Pulv. starch	4 ounces
Mix and use on the affected parts.	

Or, Pulv. zinc oxide	1 dram
Rose ointment	4 drams
Vaseline	4 drams
To be rubbed on the eruption.	

FOR ECZEMA OF THE NIPPLE.

Acetate of lead	1 dram
Glycerin	1 ounce
To be rubbed on nipple after nursing.	

TO RELIEVE ITCHING.

Subnitrate of bismuth	1 dram
Rose ointment	1 ounce
To be used on affected parts.	

DERMATITIS.

(Inflammation of the Skin.)

Dermatitis, or inflammation of the skin, is a term employed to designate those cases of skin disturbances, acute in character, which are due to the action of irritants, such as the various animal parasites, and to scratching, resulting in an inflammatory thickening of the skin.

The inflammation varies from a slight erythema to intense affections as seen in burns, scalds and frost bites.

Treatment.—Apply common baking soda (not baking powder) as a powder to the affected parts.

Other soothing solutions, such as sugar of lead, may be employed. In frost bites immediately after exposure the parts should be brought back to normal temperature by rubbing with snow or by dipping into cold water, after which oil of turpentine may be applied. Balsam of Peru is good, so is carbolic ointment. The following ichthyol ointment is excellent :

Ichthyol	three drams
Subnitrate bismuth.....	two drams
Vaseline.....	one and one-half ounces

Two ounces of common baking soda dissolved in a quart of hot water makes a good lotion for inflammation of the skin.

DERMATITIS MEDICAMENTOSIS.

(Drug Eruptions.)

Under this head is included all eruptions due to ingestion or absorption of drugs. Sometimes one dose will have such an effect ; commonly, however, an eruption results only after several days or weeks of continued administration. It is produced by the elimination of the drug through cutaneous structures, though it may sometimes be caused by the action of the drug upon the nervous system. It may be erythematous, papular, urticarial, vesicular, pustular, or bullous and, if the administration be continued, even gangrenous.

Such drugs as antipyrin, arsenic, atropia (or belladonna), bromides, chloral, copaiba, cubebs, digitalis, iodides, mercury, opium, morphia, salicylic acid and turpentine produce erythematous and papular eruptions. Itching is usually present and a moderate scaling (desquamation) may follow. Arsenic may produce erythema and erythematopapular eruptions.

Atropia may produce erythematous and scarletinoid eruptions. The bromides produce pustules, boils and carbuncles. Chloral hydrate may cause scarletinoid and urticaria, and sometimes purpura. Copaiba produces urticaria, erythematous, papular and scarletinoid eruptions. Cubebs cause erythematous and small papular eruptions. Digitalis causes scarletinoid and papular eruptions. Iodide of potassium, pustular, papular, vesicular, bullous, tuberculous, purpuric and hemorrhagic eruptions. Mercury, erythematous and erysipelatous eruptions. Iodide of potassium and potassium bitartrate, given together, are thought to have a preventive influence in the iodide eruptions.

ERYTHEMA SIMPLEX.

Erythema simplex is divided into two forms; the idiopathic and the symptomatic.

The idiopathic form is that which arises independently of any other affection. The symptomatic form is that which is due to some constitutional disturbance.

Erythema simplex is a hyperemic disorder characterized by redness, occurring in the form of variously formed and shaped, diffused or circumscribed, non-elevated patches. We include in the first class erythemas due to external causes, such as cold and heat, the action of the sun (as sunburn), injuries to the skin, chemical poisons and chemical irritants.

We include in the second class the erythemas due to disorders of the digestive tract and the ingestion of certain drugs. The idiopathic rashes are usually limited to certain localities of the skin, while the symptomatic erythemas are more or less general.

Treatment.—In the idiopathic form the removal of the causes is all that is needed, the erythema subsiding within itself in a short time, but if thought best some of the dusting powders may be used, or mild, astringent, cooling lotions, such as are used in acute eczemas. (See page 651.)

In the symptomatic forms some laxative is needed to remove the irritating substance from the intestinal canal. Epsom salts is good for this purpose. An adult should take a tablespoonful every four hours until the bowels move freely. For a child reduce the dose.

Also use dusting powders and lotions the same as in the idiopathic forms.

ERYTHEMA INTERTRIGO.

(Chafing.)

This occurs on the parts where the natural folds of the skin come in contact, and is characterized by redness, to which may be added an abraded surface, and maceration of the epidermis. There is a feeling of soreness. The perspiration and moisture of the parts give rise to maceration of the epidermis, and a mucoid discharge and inflammation may follow as results. The affection may pass away in a few days or last for weeks. The cause is usually local and the trouble is chiefly found in the region of the buttocks and genitals of children and fat persons. It is often a result of uncleanliness.

Treatment.—The folds are to be kept apart by lint or absorbent cotton, and dusting powders or cooling and astringent lotions applied. One part of linseed oil to two of alcohol, applied after thoroughly washing with cold water, will afford relief.

ERYTHEMA MULTIFORMA.

(Blush.)

This is an acute inflammatory disease, characterized by reddish, more or less variegated macules, papules and tubercles, occurring as separate lesions, or in patches of various size and shape. The eruption is usually found upon the extremities, upon the backs of the hands and forearms, and on the knees, elbows and legs. The disease comes without any warning or symptoms of malaise, gastric irritation or rheumatic pains, the eruption suddenly making its appearance, and assuming an erythematous, papular, tubercular or mixed character; but, as a rule, one type of lesion predominates. The lesions tend to increase in size and intensity, and may remain several days, then gradually fade away but, during this time, new lesions may make their appearance. In color they are pink, red and violaceous. Slight itching may or may not be present.

The papular eruption is usually found upon the backs of the hands and forearms and often upon the hands and feet. The causes are obscure. It is most frequent in the spring and autumn months, and is a mild inflammatory disease, often called blush, somewhat similar to urticaria. The diagnostic points are the uniformity of the eruption, the size of the papules, the limitation to certain parts and the absence of itching. It resembles urticaria at times, but the lesions of the latter disease are short-lived, disappearing and reappearing in the most capricious manner, are commonly seated upon the trunk and are exceedingly itchy. The outcome in blush is always favorable.

Treatment.—Quinine and saline laxatives, and local cooling lotions of equal parts of alcohol and vinegar.

PEDICULOSIS.

(Lousiness.)

Three forms of lice are found upon the human skin, which are named according to their habitats—the head, the body and the pubis. They secure their nourishment by abstracting blood, thus

producing an irritation of the skin which leads to scratching and inflammation. These parasites always remain upon the surface, and deposit their eggs upon the hair or clothing. The presence of lice upon the head is very common among children, especially the poorer classes.

Head Lice.—Associated with the eruption produced by the head louse, through the irritation of scratching, an eczema may be established behind the ears and on the neck. The parasite is the primary cause of the whole trouble. It is of a whitish gray color and easily recognizable. It moves slowly and holds on to the hair. It has six legs attached to the front part of its body, ending in prehensile hooks. The female is larger than the male and lays a large number of eggs, which hatch in about three days.

It is stated that one can lay about fifty eggs in six days and would, were none destroyed, increase to 5,000 in six weeks. The eggs are deposited on the hairs, to which they are firmly attached by some secretion from the insect.

Treatment.—The best remedy is to saturate the head with coal oil.

It should be done three times within twenty-four hours and a cap each time be placed over the head, and worn half an hour, and the head then shampooed. If the treatment is not a success it should be repeated from time to time until there are no longer any parasites or their eggs.

Many other remedies are recommended, but none of them are equal to the coal oil. Cutting the hair is unnecessary.

The Indians of New Mexico destroy this parasite with a cap made of clay. After the clay cap has been worn a certain length of time the parasites are all found dead and the hair is improved in general appearance and nutrition. The arsenic in the clay causes the death of the parasite.

Body Lice.—Unlike the head louse this insect is found more frequently among adults than among children, and among men than women. It is found especially among tramps. Its favorite places are on the shoulders and hips and around the neck and waistbands. When we find an eruption from scratching in these two regions we can suspect the presence of body lice. Always examine the seams of the clothing for the diagnosis of this form of insect is not easy, as it hides in the seams of the under clothing, where it deposits its eggs. This insect has a long proboscis which

it projects into a sweat gland from which it draws its nourishment. After the proboscis is withdrawn a drop of blood is found in the opening, there is more or less irritation and scratching and an eruption appears in the form of wheals, or a mosquito bite.

Treatment.—Take a bath, then thoroughly boil the under clothes and iron them, especially in the seams, with a very hot iron. As the habitat of the animal is within the clothes they need the closest scrutiny. This kind of lice always yields to cleanliness.

Crabs.—These animals may be found not only on the pubis, but in the axilla, on the hair of the abdomen and chest, and sometimes upon the whiskers, eyebrows and eyelashes. Sometimes the hair of the legs is covered with them. The crab clings closely to the hair at the surface of the skin; resembles wheat bran in shape and seems to assume the color of the skin, which it inhabits. It is found mostly with adults and is chiefly spread through sexual commerce and clothing and bedding. On attempting to remove the parasite it is found clinging firmly with its claws at the base of the hair with its head within the follicle. Its eggs seem to be cemented to the hair, close to the skin. Itching, with papules and inflammation in the pubic regions, should always lead to the suspicion of the presence of crabs.

The diagnosis is between that of itch, eczema and pruritis.

Treatment.—

Beta naphthol	one-half dram
Lard or vaseline.....	one ounce

Whatever the treatment, the parts should afterward be well bathed, and some anti-parasitic must be used to kill the insect and its nits.

Tobacco juice and fish berries are often used, but neither is as effectual as bichloride of mercury, from three to five grains to an ounce of water, or ten grains of the bichloride to one ounce of lard.

SCABIES.

(Itch.)

Sarcoptes or *acarus scabies* is a small animal parasite that gets its living from the human skin. It is a white insect, so small as to be hardly visible to the naked eye, has eight legs and burrows in the skin. It frequents the thinnest and most tender parts

of the skin, and is usually first observed between the fingers. From the hands it is communicated to the genital organs. In females the insect is especially found around the nipple and over the hips. The diagnosis is very easy from the burrows which the insect makes. Only the female is found in these burrows. She enters the skin for the purpose of nutrition and depositing eggs.

The burrows are in lines, sometimes straight and sometimes curved. The eggs are deposited along these burrows, which vary from an eighth to a half inch in length and which, under a small magnifying glass, appear like finely dotted lines. The female is found at the end of the burrows and dies there unless scratched out. The young follow the same course as the old ones, the irritation produced causes inflammation, and there are found papules, vesicles and pustules.

There are more than one variety of scabies, and some of them are found upon sheep, horses, cattle, pigs, dogs and cats. The same remedies as used on the human body will prove effectual on all lower animals, if properly applied.

Treatment.—The patient should first be soaked all over in warm water, and soap should be rubbed freely and thoroughly into his skin for half an hour, or until the skin is well softened, after which the following ointment should be well rubbed in:

Sulphur precipitate.....	one-half dram
Balsam of Peru.....	one-half dram
Lard or vaseline.....	two ounces

Or use: Beta naphthol.....two drams
Lard or vaseline.....two ounces

Each of these should be thoroughly mixed. Bichloride of mercury should not be used, since, by spreading it over a large surface, its absorption might poison the patient.

After the above treatment the patient should be dressed in clean clothing and the infected clothes carefully cleansed and ironed with a hot iron or kept two hours in an oven in a heat of 300 to 350 degrees. As some of the eggs may not be reached by the first treatment, repetition may be necessary, but over-treatment is not desirable, as it would keep up the irritation begun by the parasite.

There is a mystery in the vitality of lower animal life. The lower forms are almost deathless, and the very lowest, if left to

themselves, are immortal. The single cell does not die, but divides into two cells which again divide and subdivide to infinity. Death is a result of complex or higher organization, and the higher the organism the more easily it is destroyed. This fact should always be kept in view in using remedies. It is often easier to kill the patient with germicides than to kill the germs.

CIMEX LECTULARIUS.

(Bedbug.)

The real habitat of this animal is not merely the bed and bedding, but cracks in the walls, floors, chairs, cushions, sofas and seats in public conveyances. The bite produces itching, consequently scratching, then an eruption which is ordinarily attributed to bad blood. When the bug punctures the skin it injects an irritating fluid, which causes an increased amount of blood in that locality. This puncture produces a stinging sensation and an eruption in the form of wheals, which is liable to be mistaken for urticaria. That from bedbugs is usually upon the back, while that from urticaria is upon the front portions of the body. When the pests are removed the inflammation in the skin usually disappears. This inflammation is best treated by a saturated solution of bicarbonate of soda, ammonia water or spirits of camphor. To rid the home of these pests all cracks in the bedsteads, floors, walls and furniture should be liberally treated with boiling water or a strong solution of bichloride of mercury. For cushions, sofas, etc., gasoline or kerosene should be freely used.

CHAPTER III.

TINEA TRICHOPHYTINA.

(Ringworm.)

The two words *tinea* (gnawing) and *trichophytina* (hair-plants) are used to designate a genus of very tiny plants, known to scientists as microscopic fungi, which often effect an entrance into the human skin and there, in and beneath the epidermis and in the follicles, live as parasites, rapidly multiply, poison the tissues and cause inflammation, resulting in the diseases of the skin known as follows:

Tinea trichophytina capitis, or ringworm of the scalp, scald-head.

Tinea trichophytina circinata, or ringworm of the body, trunk and limbs.

Tinea trichophytina sycosis, or ringworm of the face, barber's itch.

Tinea trichophytina cruris, or ringworm of the crotch and axilla.

Tinea trichophytina unguium, or ringworm of the nails.

There is a difference of opinion as to these diseases. Some investigators think that they are all really one and the same disease caused by identically the same fungus, the characteristic symptoms varying in each case according to the part of the body attacked; that the microscope discloses no difference in the germs, either in shape or arrangement, and that experiments have proven that all forms of the disease may be produced from cultures derived from one germ. Others incline to the opinion that there are many varieties of these little plants, just as there are different kinds of oaks, that each has its preference for certain tissues or locations on the body, and that each produces a poison that causes its own peculiar type of ringworm. It is not of much importance to know which view is correct, for the fungi in all the forms are destroyed by essentially the same germicides.

RINGWORM OF THE SCALP. SCALD-HEAD.

As already indicated this disease is caused by a trichophyton finding a lodging place in the scalp and vegetating there. It is most often found among children, and begins as a small pale-red or gray spot, slightly elevated, and covered with fine bran-like scales. As fast as the follicles become much involved their hairs get dry and brittle, and either break off near the skin or fall out. In mild cases the hair will grow again, but in the deep seated forms, such as usually occur in scrofulous and other ill-conditioned patients, there is likely to be a pustular eruption, thick yellow crusts, and superficial abscesses of the scalp, resulting in the destruction of the follicles so that in the affected patches the hair is permanently destroyed.

Unless arrested the disease may continue to slowly spread until it extends over the entire scalp and down upon the neck, and, although there is not much pain aside from the discomfort from itching, the appearance of the scalp becomes repulsive in the extreme. Sometimes, though not often, it is difficult to distinguish this disease, in its earlier stages, from several other affections of the scalp, but by moistening a few of the affected hairs, or a small piece of the outer skin, in liquor of potassium, then examining them with a lens, magnifying from 250 to 300 diameters, the fungi and their spores will readily be detected if it be a case of trichophytina. The chloroform test is also quite positive, and many rely upon it instead of resorting to the microscope. It consists of dipping affected hairs in chloroform. If they turn white when thus treated, it can be depended upon that the trouble is ringworm of the scalp.

Treatment.—There are two principles to be employed in the treatment of this disease:

1. The application to the scalp of some germicide which will destroy the parasites without doing much harm to the skin itself. Mercury, iodine, sulphur, and many other substances will destroy the fungi when brought in contact with them, but the problem is to get the remedy to so penetrate as to reach the microbes down within the epidermis and hair follicles.

2. The exclusion of air, for this fungus is known to require oxygen. To secure both of these ends—penetration of the germicide into the epidermis and the depths of the follicles, though at the same time filled with their diseased hairs, and smothering the

microbes by the exclusion of air—various means are used, all of which require care.

First wash the scalp with tincture of green soap (*saponis viridis* two ounces to one ounce of alcohol), made into a lather with warm, soft water, dry the scalp with hot towels immediately after, then thoroughly anoint with the following ointment:

Carbolic acid.....	five to twenty grains
Red oxide of mercury ointment.....	one to two drams
Nitrate of mercury ointment.....	one to two drams
Rose water.....	one ounce

This treatment should be applied every morning, and as heat and moisture promote the growth of the fungi, the head should be kept cool and dry, and washed only when preparing the scalp for the anointing.

Single patches may sometimes be destroyed by tincture of iodine, well and frequently rubbed into the spots, and its drying and hardening may be prevented by the addition of a little glycerin, about a dram to the ounce. The principal remedies which have been employed in solution are bichloride of mercury, salicylic acid and borax. From two to ten grains of the bichloride, dissolved in a half ounce each of water and alcohol, are very efficient in destroying the fungus, but there is difficulty in getting it to penetrate deeply enough to reach the germs in the lower tissues, although there is some danger from absorption of the poison. It should never be used over a very large surface, especially if of a strength of five or more grains to the ounce of water or alcohol, and should there be increased tenderness in the parts to which it is applied, or a green diarrheal discharge from the bowels, the bichloride treatment must be discontinued immediately, for these symptoms indicate mercurial poisoning.

Dr. Shoemaker, who has had large experience, says in his *Diseases of the Skin*, D. Appleton & Co.: "I usually begin by directing the diseased spots to be sponged every day or two with a weak alcoholic solution of thymol, borax, naphthol, or mercuric bichloride, and to be then thoroughly saturated with a fifty-percent solution of boro-glyceride. The latter solution cannot be recommended too highly. In the early stages of ringworm of the scalp I have obtained many rapid cures from its use alone. Borax is one of the most efficient antiseptic and antiparasitic agents. It

also possesses mild astringent powers, and tends to allay the itching and irritation of the disease. The glycerin has great penetrating properties, and carries the parasiticide deep into the follicles. It also has great affinity for water, which it withdraws from the tissues, thus depriving the fungus of one of the elements most contributive to its existence. The boro-glyceride solution may be applied night and morning with a little sponge or mop, and should be well rubbed into the skin with the tips of the fingers. It is destitute of any poisonous or irritating qualities, and acts as a preventive of further contagion, as the parasite adheres to the glycerin and is not cast off to be wafted about in the air."

Salicylic acid, either as a solution or in an ointment, is destructive to the fungus and may be safely used. It is also valuable in collodion, ten to thirty grains of the acid to the ounce of collodion, painted over and around the spot, after shaving off the hair, but many are averse to shaving the hair, as likely to increase the itching without affording any substantial advantage. The following are formulæ for the solution and ointment:

Salicylic acid.....	one to four drams
Rectified spirits of wine.....	one-half ounce
Glycerin	one ounce
Distilled water.....	two ounces

Salicylic acid.....	one to two drams
Vaseline	one ounce

The following is an excellent remedy, but for reasons already given must be used sparingly and with care:

Bichloride of mercury.....	ten to twenty grains
Green soap.....	two ounces
Rectified spirits of wine.....	one ounce

It must be remembered that this disease is not only contagious, but that it is sometimes disseminated by spores borne for some feet through the air. To prevent the latter danger the scalp should be kept anointed that spores and dried fungi may not escape into the air, and as a safeguard against contagion, the patient should be isolated as far as practicable from other children, should sleep in a separate room, and should not touch the clothes, brushes, combs, wash-basins or towels of other persons (and all towels used upon him should be boiled to prevent them from be-

coming mediums of contagion). The spores retain their vitality for many months, and special care must be taken against the infection getting into woollens of any kind, since such fabrics make the best hiding places for germs. After treating the patient, the nurse should, each time, thoroughly wash her hands with the tincture of green soap and water. If the green soap cannot be obtained, the old-fashioned soft soap is the best substitute.

RINGWORM OF THE BODY, TRUNK AND LIMBS.

Ringworm of the body varies greatly in form and appearance in the different cases, from a single small spot which may be easily checked, to an extensive eruption, covering much of the surface. The small red spot with which it begins cannot be distinguished at first from other lesions, but it soon becomes a little scaly, enlarges with considerable rapidity, and in from two days to a week may be a half-inch in diameter. As it increases in size there is a tendency to clear in the center, so that the inflamed portion assumes the form of a ring, leaving the skin at the center, however, not perfectly healthy, but of a yellowish hue and more or less scaly. As the diameter of this cleared place continues to increase, an affected spot may likewise appear in its center and follow a course similar to that of the first one, and, by several repetitions of the process, as many concentric rings be formed on the surface of the body. Itching may or may not be an accompaniment, but usually there is enough of it to cause discomfort, and sometimes is so excessive as to be quite painful. The affection is very much like the other forms of ringworm, and is a superficial inflammation of the skin wholly due to the development in its outer layers of some form of the trichophyton already described. Its gravity principally depends upon the physical condition of the patient. Sometimes it runs its course and disappears without any treatment, in other cases it may become chronic and remain a long time, even disappearing in summer only to reappear in winter. The cases contracted from lower animals are likely to be more severe and last longer than those taken from persons.

Treatment.—Any application that will destroy the life of the parasite without causing much inflammation of the skin will be of service. The preparations of mercury, iodine, sulphur and a few other substances are the remedies most used. An ointment of the white precipitate, red oxide, or nitrate of mercury, one part of

either to five parts by weight of lard, well mixed, with five drops of carbolic acid and a half-dram of sulphur added to each ounce of the mixture, is an excellent application if well rubbed in. Two drams of hyposulphite of soda in an ounce of water will often quickly destroy the parasite; and from two to ten grains of bi-chloride of mercury to a half ounce each of water and alcohol, care being taken to apply it only to small areas, and to reduce the strength or discontinue the remedy in case of symptoms of poisoning appearing, as described in the treatment for ringworm of the scalp. Ten to forty grains of chrysarobin to the ounce of lard is very effective, but the disagreeable stain it imparts to clothing is an objection.

The patient finally gets well but the disease may be so obstinate as to require very faithful and persistent treatment, for until the last germs are killed there is likely to be a relapse. There should be frequent changes of clothing, and as soon as removed the soiled clothing should be boiled.

RINGWORM OF THE FACE. BARBERS' ITCH.

In its earlier stages this affection is confined to the outer layers of the skin. It begins as one or more red points, each of which gradually enlarges and becomes an inflamed area, as in ringworm of the body, which it resembles more than it does ringworm of the scalp, both in the greater severity of the inflammation and in the rapidity with which it spreads over considerable surfaces. The beard does not show the same tendency to break that is seen in the hair in ringworm of the scalp, but, as the disease progresses and the fungi penetrate the deep follicles of the beard, their hairs die and become so loose as to be easily rubbed out with a towel, or removed with forceps without pain to the patient, and this peculiarity is a very strong diagnostic feature of the disease. At this stage the inflammation has become deeply seated, the affected places painful, swollen and puffed, giving a boggy sensation to the touch, and an impression that there may be pus within that should be let out with the lance. The nodules, or inflamed places, may run together and form one or more large swellings or lumps, the surface of which may be covered with a yellowish crust. As to severity, the disease varies greatly in different cases, but it is likely to be very persistent and hard to get rid of, for until the last germs are destroyed they may multiply and cause a return of the trouble. It often takes months, sometimes years, to effect a cure.

Treatment.—Each morning wash the hands, face, neck and lastly the affected parts carefully and very thoroughly with suds of soft water and tincture of green soap, dry with a clean, warm towel, with forceps carefully remove all loose hairs, and with cotton or a soft cloth immediately apply to the swollen places the bichloride solution as recommended for ringworm of the body, then cover with a little absorbent cotton, binding it on loosely. It is well to begin with a two-grain solution, and in case the disease seems stubborn, increase its strength up to ten grains to the ounce, always remembering that bichloride solutions are deadly poisons and are safely applied to only small areas. Every evening at bedtime the parts should be washed in a saturated solution of boric acid, dried and anointed freely with the following:

Carbolic acid.....	five to ten grains
Tannic acid, pulverized.....	one-half dram
Glycerite of tannin.....	one-half dram
Sulphur precip.....	one-half to one dram
Rose ointment.....	one ounce

The boro-glyceride treatment recommended for ringworm of the scalp is excellent also for this form of trichophytina.

Do not lance. Be very thorough and regular in the treatment. Unless the patient is in a bad constitutional condition, he will require no internal remedies. The same caution must be observed in regard to the contagion in this as in other forms of ringworm, for it is claimed that the fungus of barber's itch will cause both ringworm of the scalp and ringworm of the body, and there is more danger of children contracting either of these two diseases from this source than there is of one man acquiring barber's itch from another. As a medium of the contagion it is thought that the shaving brush is much more dangerous than the razor. Like the other forms of ringworm, it is sometimes contracted from the lower animals.

RINGWORM OF THE CROTCH AND AXILLA

This is the same disease as ringworm of the body, differing from it in appearance and intensity only because of the greater warmth and moisture and perhaps thinner skin at the armpits, the fold between the buttocks, and the adjacent parts—conditions fa-

voring the rapid growth and multiplication of the fungi. The inflammation in this form is much greater than in the ringworms of the other locations, and the itching and suffering therefrom are sometimes very severe.

Treatment.—The same treatment as that recommended for ringworm of the face will be found efficient here. The addition of thirty grains of salicylic acid to an ounce of the carbolic ointment, well mixed and applied morning and evening by thoroughly rubbing it into the skin of the affected parts, will often cure, but, like the other ringworms, this form is also liable to be troublesome for a long time. Thorough and frequent disinfection of the clothing by boiling, and disinfection of the parts and their surroundings, by washing with the green soap tincture, then applying the bichloride solution to small surfaces, or, considerably diluted, to larger ones, will greatly assist in overcoming the parasite.

RINGWORM OF THE NAILS.

This is so rare as not to demand a separate consideration here. It must be treated by germicides very persistently, for the difficulty of reaching the fungi under the nails often results in their doing mischief a long time. Scratching to relieve the itching from other forms of ringworm is a fruitful cause of this aggravating trouble. As a precaution, the hands should be carefully washed with soap and water, and the nails well cleaned after treating any form of ringworm.

CHILBLAINS.

A chilblain is an inflammation of the skin and is characterized by redness, and intense itching and burning. It is found most often upon the heels and toes, but may occur upon the nose and ears. It is caused by exposure to cold.

Treatment.—Soak the feet in water as hot as can be borne, then shower them in cold water, rub dry, and apply carbolic ointment, made by adding ten drops of carbolic acid to an ounce of melted lard or vaseline and stirring until cold. If the blains are ulcerated, wash well with warm water and castile soap, dry them and apply the ointment. Some prefer to wash the parts three times a day in the following lotion: Oil of turpentine, two ounces; spirits of camphor, three drams.

Bathing the feet in warm salt water every morning and even-

ing is said to prevent chilblains. Wearing warm woollen stockings, by stimulating the circulation, affords an additional safeguard.

CLAVUS.

(Corn.)

A clavus or corn is a small, flattened, deep-seated formation, usually upon the toes, but sometimes upon the soles or other parts of the feet. It appears like a callous and is a thickening and hardening of the scarf skin, caused by friction or pressure, and generally a result of tight or ill-fitting shoes. Soft corns are formed in the same way as hard corns, but are between the toes where the moisture of the foot keeps them from drying and hardening.

Treatment.—Soak the feet fifteen minutes in hot water, then scrape away as much of the thickened tissue as can be removed without pain or bleeding, and paint the corn, but not the surrounding skin, with the following:

Salicylic acid.....	thirty grains
Extract Indian hemp.....	ten grains
Collodion.....	six to twelve drams

Repeat the painting morning and evening for three days, then soak the feet again in hot water and the entire corn, in most cases, can be easily removed, but care must be taken not to try to remove it too soon, or to make it bleed, as peeling down into the live flesh would make it very sore, hence proceed carefully, and if necessary paint again. Soft corns may require searing with a stick of nitrate of silver, or a little acetic acid. It is a severe resort, but in case its use is required, oil the surrounding parts to prevent the healthy skin from being burned, then apply the acid with a small stick, as a tooth-pick, after which cover the wound with soft cloth saturated in linseed oil and later remove the dead skin.

Tincture of iodine, applied night and morning after carefully scraping away all dead tissue, is recommended.

To prevent further friction and pressure wear a piece of felt or thick, soft leather, with a hole in the center, just over the corn. Remove the cause and corns will usually get well without treatment. They can be avoided by wearing shoes of soft, pliable leather, that properly fit the feet and by often bathing the feet and keeping the nails pared, and all dead skin and callouses removed.

BUNIONS.

Bunions are enlargements of the joints of the great toe, sometimes of the little toe, caused by wearing too tapering, narrow or short shoes, the pressure and irritation causing the skin to swell and become very painful.

Treatment.—Wear large, easy shoes, and, if the skin is not too much inflamed, apply an adhesive plaster to the bunion and wear it until there is no more trouble. If badly inflamed, apply a bread and milk or other soothing poultice until the inflammation is gone, then apply iodine ointment, fifteen grains to the ounce of lard, and rub it in thoroughly night and morning.

Wear felt or leather plasters cut in the form of rings, as for corns, to protect the joint from pressure. Some advise bathing the part in biniodide of mercury, two grains to the ounce of water.

ONYXIS.

(Ingrowing Nails.)

This very painful ailment usually occurs upon the great toe, and is caused by tight shoes or some injury to the toe that has distorted the matrix.

Treatment.—Scrape the entire nail until as thin as it can be made without bleeding, soak the foot fifteen minutes in hot water, after which remove all dead skin and scrape the ingrowing edge, and crowd under it a pledget of cotton, wet the cotton with a few drops of perchloride of iron night and morning until the over-reaching flesh has become so benumbed and deadened that after soaking in hot water it can be rubbed off.

An old and good method, first used by Dr. Finch, is to take a small, thin piece of silver plate, bend one side to make an up-turned flange and crowd it under the ingrowing edge, after the nail has been well softened by poulticing twenty-four hours, then bend the plate over the end and side of the toe and hold it in place by adhesive plaster. In a few days the toe will be well.

ONYCHIA.

(Run-around.)

This disease is most common in children and is due to an unhealthy condition of the system, or to some slight injury. It begins by inflammation in the matrix, and a small ulcer eats its way through the soft tissues about the nail and, if unchecked, may

spread until the entire nail becomes involved, loosens and drops out. The bone may also become affected and enlarged.

Treatment.—Apply hot linseed meal poultices. Wet the part each day in a strong solution of salt, alum or sulphate of zinc. If pus forms remove it and into the ulcer rub a little powdered salt or alum. Also take measures to improve the general health by diet and observance of hygienic laws. The use of a gentle tonic is recommended, such as ten to twenty drops of the syrup of the iodide of iron three times a day.

WHITLOW OR FELON.

A whitlow or felon is a very common form of inflammation of the fingers. It is usually situated in the subcutaneous tissues, or in the fascias that bind the tendons and hold them in position; or it may be in the cellular tissues that connect with the bone and the tough inelastic membrane, called the periosteum, enveloping the bone; but in the more intense varieties the disease is usually located within the periosteum itself. Again we find the inflammation in the tissues around the margin of the nail, but this form is generally mild and not likely to result in serious damage.

The principal cause of a felon is some injury, often slight and unnoticed at the time, to the affected tissues when the blood has become impoverished, as from poor diet, bad air, dissipation, etc. It usually occurs on the inside of a finger, with sharp pain and swelling of the pulp, the former increasing in intensity and the latter in size until frequently it extends quite around the finger, and often the entire hand becomes swollen, tense and hard. After the third or fourth day the pain assumes a throbbing character, and the patient can get neither rest nor sleep. There is but little fever, the temperature not rising more than one degree and the pulse remaining nearly normal. From the fifth to the sixth day pus forms which, if allowed to remain, is likely to burrow under the tight, fibrous bands surrounding the periosteum, and may result in its destruction and the death of the bone.

Treatment.—Cleanse the part and soak it for a little while two or three days, then, until the fifth or sixth day, use ichthyol and vaseline in equal parts, to thoroughly soften the tissues, then lance, using care to make a large incision and to carry it down to the bone. This can usually be done as well from the side of the finger, and with less danger to the tendons than by cutting

through the palmar surface. Do not postpone lancing longer than the sixth day or it may be too late to save the joint.

After the lancing and evacuation of pus, the cavity should be well cleansed every day with a solution of hydrogen peroxide, diluted with twice its volume of distilled water. An ounce of castor oil with sixteen drops of carbolic acid also forms a good cleansing agent and may be used instead of the peroxide.

Constitutional treatment consists of quinine and iron, also in general improvement in diet and the securing of more hygienic surroundings. In old people the urine should be tested for sugar, as this trouble is likely to be associated with some other depraved condition of the system.

NEVUS PIGMENTOSIS.

(Mole.)

Moles are dark, circumscribed spots upon the skin, sometimes smooth, sometimes rough, either flat or elevated, and of the size of a pinhead to a bean, or larger. They may be the seat of long, coarse hairs, are very common, are usually permanent and often cause much disfigurement of the face and neck.

Treatment.—The best way is to remove them by electrolysis, as that is less likely to cause ugly scars than either the knife or caustics, both of which are often used. Any change in the appearance or growth of a mole should be followed by immediate removal, as melanotic cancers frequently develop from moles. The danger from this is greatest in persons in middle or later life.

FURUNCLES.

(Boils.)

A furuncle, or boil, begins as an acute deep-seated, inflammatory, circumscribed, rounded or more or less acuminate, firm, painful formation usually terminating in the formation of a central core and its discharge by suppuration. Long before the exciting cause of boils was understood, they were known to be associated with a depraved condition of the general health, but they are now known to be due to either of two kinds of germs, of which one produces white, the other yellow pus. They are very common germs and are always liable to be upon the surface of the skin, but it is thought that they can pass through into the tissues only when the skin is in an unhealthy condition, as when the patient is suffer-

ing from diabetes melitus, anemia, blood poisoning, eczema or other skin disease, or after an attack of fever or some other wasting disease, or from overeating or under exercise, or when the skin has suffered external injury, as from scratching or chafing. It is probable that their entrance is chiefly made through diseased follicles. Boils usually appear singly at first, but may follow in crops, and sometimes reappear for weeks or months.

Treatment.—If treated early enough, a boil can usually be aborted, stopped by applying to its center a drop of strong carbolic acid with any small instrument, as a toothpick, once in five or six hours. If this fails to relieve, a five-per-cent solution of carbolic acid should be injected with a hypodermic syringe into the apex of the boil, care being used to reach the core. Instead of this, a sharpened hardwood toothpick may be dipped in strong carbolic acid, then quickly thrust to the center of the boil. If done early enough, either of these measures is likely to effect a cure, and the pain caused lasts but a short time. The use of the acid should be followed by a dressing of soft cloth, saturated in carbolized vaseline or boric acid solution.

If the boil has been allowed to go on until it is too late to stop it, lance to the core as soon as pus is fully established, after which a boric acid solution, or better still, a solution of bichloride of mercury, from one to three grains to the ounce of water, should be applied to prevent the formation of new boils; after which the wound may be dressed with the carbolized vaseline. A boil should never be pinched or squeezed, and it should not be poulticed, for the heat of a poultice only favors the development of germs, and its softening the skin facilitates their penetration to the subdermic tissues, thus helping in the production of more boils. It is often because of such self-infection that successive crops of boils are due.

The old idea that it was unsafe to "scatter a boil" lest it appear elsewhere upon the patient or cause him serious illness, has been discarded. To abort a boil does not mean to scatter it, but to kill it by killing the bacteria producing it, before they have developed in sufficient numbers to cause suppuration. That the patient may almost immediately be troubled by other boils is not due to the same bacteria that caused the aborted boil, but, usually, to a continuance of the same unhealthy condition of the skin, permitting the entrance of other pus germs from the outside. Neither is it true that "every boil is worth five dollars," for a boil depletes and contaminates the blood instead of purifying it.

CARBUNCLES.

A carbuncle is an acute, circumscribed, phlegmonous inflammation of the skin and subcutaneous structures, terminating in a slough. They are seen in those of middle to advanced age, more commonly in men, and most frequently upon the nape of the neck and upper part of the back. There is rarely more than one at a time. The carbuncle usually begins with malaise, chilliness and febrile disturbance. There is a firm, flat, inflammatory infiltration in the deeper skin and subcutaneous tissue spreading laterally and finally involving an area of from one to several inches in diameter. As the infiltration and swelling increase the skin becomes of a dark red color and, sooner or later, at the end of ten days or two weeks, softening and suppuration begin to take place and the skin finally gives way at small points through which sanious pus exudes. The whole mass at last sloughs away, either in portions or in its entirety, resulting in a deeper ulcer, which slowly heals, and leaves a permanent scar. In some cases, especially in old people, sympathetic constitutional disturbance of a grave character is an accompaniment. Blood poisoning is sometimes developed and a fatal result may ensue.

The same causes are considered operative in a carbuncle as in furuncles; general debility and depression predisposing to its formation, and the introduction of the microbes peculiar to this affection. Inflammation starts at the same time from several points—from the hair follicles, sweat glands, or sebaceous glands—the inflammatory centers break down and the pus finds its way to the surface, the process ending in a general slough.

When carbuncles occur about the head their development should always be carefully watched and proper remedies applied.

Treatment.—At the early stage the formation should be injected with a five or ten per cent solution of carbolic acid, or the whole surface may be covered with a twenty-five-per-cent ichthyol ointment. Where there is breaking down of the parts, a cupping glass may be used to withdraw the pus, and carbolized glycerin or carbolized water introduced into each opening, and ichthyol ointment afterward rubbed in. If the process is slow, with a tendency to sloughing, the ulcer should be scraped out and dressed antiseptically. Bathing the site of the carbuncle with the bichloride solution, as with boils, to prevent the formation of more carbuncles, should not be neglected. The constitutional treatment consists

of the free administration of the chloride of iron. Give ten to twenty drops in one-third of a glass of water every four hours.

ANTHRAX.

(Malignant Pustules.)

Malignant pustule is a lesion, somewhat like a furuncle or carbuncle, resulting from virus generated in an animal suffering from splenic fever, and is accompanied by constitutional symptoms of more or less gravity. A fatal termination is not unfrequent. It is due to the bacillus anthracis.

Treatment.—The part containing the point of inoculation should be immediately cut out, care being used to remove all the tissues that have become infiltrated with the poison, and to thoroughly wash the wound in a one to one thousand solution of bichloride of mercury, then to cover it with iodiform gauze. Some prefer cauterizing with a hot iron, and injections of a five-per-cent solution of carbolic acid are sometimes used, but, unless applied at a very early stage of the disease, the knife is the surest remedy. This, however, cannot always be employed, as when the swelling has become great and the infiltration widely extended, so that excision is impracticable. In such cases injections may be the last resort. The needle of the hypodermic syringe should be inserted full length and the fluid thrown in as the syringe is being withdrawn. This should be repeated a half dozen times or more, at different places within the border of the swelling, that the acid may reach every portion of the affected tissues. These injections should be repeated every four or five hours, until the swelling is checked or there appear symptoms of carbolic poisoning. When there is edema, free, deep incisions should be made over the infected region and the wounds copiously irrigated with strong antiseptics, care being taken to get them into the wounds very thoroughly. The above named bichloride solution is probably as good as any for this purpose. Use ice bags over the part infected. Tonics and stimulants should be given internally. When there are symptoms of general infection, alcohol is recommended in large doses. Quinine may also be given. When the poison has been subdued, poultices should be applied to the wound until the deadened parts slough away, after which it may be healed. One part of carbolic acid in six of pure olive oil makes an excellent dressing.

ERYSIPELAS.

(Rose. St. Anthony's Fire.)

Erysipelas is an acute, infectious inflammation of the skin and subcutaneous tissues, is characterized by shining redness, smoothness, swelling and heat of the part affected, and a tendency in some cases to vesicles, and is accompanied by more or less fever.

It was formerly considered as of two kinds: The idiopathic, or that which first appears upon an unbroken skin; and the traumatic, or that which begins in wounds or abrasions; but it is now known that all cases of this disease are due to one and the same cause, the germ *streptococcus erysipclatis*, which, having gained an entrance to the skin, multiplies and produces a poison that gives rise to the various manifestations seen in the different cases. Some hold that the germs are able to effect an entrance through the skin only where it is broken and that this lesion may range from the slightest scratch to the severest wound; while others, seemingly with as good logic, contend that it may also enter when there is no abrasion if the skin be in a low condition of vitality, as when the patient has been suffering from some other disease, from poor nutrition, dissipation, bad air, a long period of protracted heat, overfatigue, etc. Certain it is that in this class of persons the disease is quite frequent and that it seldom attacks those in robust health. It is most common, however, in young infants and adults from twenty to thirty years of age, in women during menstruation and the lying-in period, and in those suffering from wounds. The navel of the newborn and the breasts and genitals of the parturient woman are especially liable to its attacks in cases where proper attention has not been given to cleanliness or the surroundings are bad. It formerly swept through the surgical and lying-in wards of hospitals with such mortality as to make "hospital erysipelas" a terror greatly to be feared, but now, thanks to the discovery of the germ causation of disease and of aseptic and antiseptic methods of controlling infections, it would be considered an unpardonable disgrace to the management of any hospital to permit even a few successive cases to occur within its walls.

A mild form of the disease is often seen at the outlet of the nostrils, taking its origin from an inflammation of the hair follicles just within the nose, but these cases are usually without

serious constitutional symptoms. A mild form of erysipelas is also sometimes seen upon the fingers and hands, starting in some little wound that becomes infected with the erysipelas germs; but in cases in which the deeper tissues and organs become involved the disease is a much more serious matter and is likely to be accompanied by grave constitutional manifestations.

Symptoms.—The disease is ushered in by a feeling of chilliness followed by fever, though for a period varying from a few to twenty-four hours there is likely to have been headache, general depression and poor appetite, if not vomiting. The eruption, when first seen, is likely to be a patch an inch or more in diameter, of bright red color, slightly raised or swollen, smooth and shining. The redness disappears when pressed, but reappears as soon as the pressure is removed. Gradually increasing, the inflamed area gains its greatest size in a week or ten days and may then vary from a patch three inches across to one very much larger; a day or two later it gradually subsides, loses its color and ends in scaling or peeling. Dr. Hyde says: "Until the inflamed area reaches its greatest extent the fever continues, and may go as high as 106 degrees, is likely to be highest at night, and to be accompanied by pain in the stomach, head and back. . . . Sometimes pustules and small blisters form and gangrene of the skin may follow. . . . Sometimes the inflamed area seems to advance, extending on one side as it heals on the other."

Treatment.—Purge by giving the patient Epsom salts, a tablespoonful every three hours, until the bowels move freely. Follow with tincture of chloride of iron and quinine, one-half dram quinine to one ounce tincture of chloride of iron, giving ten to twenty drops every four hours.

Bathe the part with a saturated solution of boric acid, then smear it with ichthyol ointment. The affected part may be painted with tincture of iodine, covering a margin of the healthy skin to prevent the disease from spreading, for although this is not always successful it sometimes is. The remedy is a severe one for thin skinned people, hence for children and females whose skin is delicate lotions of sugar of lead may be used instead. They relieve the burning and soothe the inflammation and are a most valuable remedy.

Powdered boric acid may be dusted upon the reddened part, then a covering of several thicknesses of cloth, neatly cut

to the size and shape of the inflamed patch, may be wrung out of cold water and so applied that its edges shall not extend beyond the borders of the reddened area. Patients to whom cold is agreeable may place over this an ice bag. Unless accompanied by some other disorder erysipelas runs a favorable course and terminates in recovery in from one to three weeks, but in certain conditions it is a very dangerous disease. Fortunately, perfect safety can usually be obtained at these times by using proper precautions against contracting this disorder.

From what has already been said it will be understood that it is very important that women recently delivered or about to be confined, newborn infants, anyone suffering from wounds or sores, and the weak and debilitated, should never be allowed to remain in the same house with a case of erysipelas, unless the sick-room be far removed and wholly cut off from the living rooms, no one be allowed to pass from the sick room to the other rooms, and unusually thorough and efficient precautions be taken in the line of ventilation, cleanliness and disinfection, to prevent the dissemination of the disease.

In days which we hope are all gone by, many a physician, from failing to properly cleanse his hands, face, beard and hair, or to don clean clothing in place of that infected with erysipelas, has carried death, in the form of so-called puerperal fever, to a patient in labor or the lying-in, and, later, it may be, in common with the friends of the loved one, has wondered at the strange dispensations of Providence in removing while in her prime the light and very life of her home. (See Care of Infectious Diseases in the department upon Nursing.)

LENTIGO.

(Freckles.)

Freckles are round and irregular, yellowish, brownish or blackish spots, of pinhead to pea size, usually occurring on the face and backs of the hands. The affection is a very common one and varies in degree of development. The spots may be few and insignificant or may be so abundant as to greatly disfigure the complexion. They are generally caused by exposure to heat and wind during the summer season. Those of light complexion, with light or red hair, are most liable to this trouble, especially when the spots are of a reddish brown color. Freckles consist of deposits of pig-

ment within the mucous layer of the skin. They can be removed by proper treatment, but are liable to return.

Three grains of corrosive sublimate in an ounce of water makes a wash that applied three times a day usually removes the spots, and is one of the best remedies, but it is poisonous and should be used with care. It must not be applied to a very large surface.

From one to six parts of lactic acid to twenty parts of water may be used. Five to ten grains of salicylic acid in an ounce of water, and applied three times a day, has been recommended. Either of the following stock prescriptions may be applied several times a day:

Subnitrate of bismuth.....	one dram
Ammoniated mercury.....	one dram
Rose ointment.....	one ounce

Or, Bichloride of mercury.....	ten grains
Almond emulsion.....	six ounces
Tincture of benzoin.....	one dram

CHLOASMA.

(Liver Patches.)

This disorder is characterized by single or multiple discolorations of the skin, varying in shade from a light yellow to a reddish brown, or even a blackish hue. It occurs in well defined patches, usually symmetrically distributed over the face, but sometimes found upon other parts of the body. Like freckles, the spots are produced by excess of pigment in the mucous layer of the scarf skin. The corium is not involved, but in some cases the blood vessels in the papillæ have been found in a somewhat dilated condition. By bringing an excess of blood to the skin, these vessels were agents of the disorder, for it is from the blood that the pigment is derived. Those parts naturally most shaded with pigment are the places where the disease is most likely to appear.

The causes are many and varied. External injury is one of them; disease of the suprarenal capsules, and of the liver, is another very frequent one, and disease of the womb is sometimes given as a cause, but it is likely that these cases are really due to liver trouble, as diseases of the womb and liver often go together. When due to inaction of internal organs, the spots are generally

distributed over the body, but when caused by external injury, they are circumscribed and confined to the locality injured. Again the spots are sometimes due to micro-organisms.

The treatment must vary according to the variety of the affection. If caused by external injury, rubbing the part in warm water is usually sufficient, the spots disappearing after a few days. If of germ origin, the spots should be bathed three times a day in a solution of bichloride of mercury—from two to four grains to the ounce of water. If from a disordered liver, the treatment should be directed to that organ and the general health improved, when the spots will probably disappear. Always be careful in the use of the bichloride of mercury and not spread it over a very large surface, lest poisoning result from absorption.

DISORDERS OF THE SWEAT GLANDS.

Defective Sweat.—This is a disorder which may be local or general, congenital or acquired. There may be only slight diminution, or a complete absence of perspiration. Many people, for no apparent reason, sweat but little or none at all. The disorder is a symptom of some other disorder, as of fever at certain stages, diabetes, Bright's disease, etc. Local and circumscribed anidrosis is due to some injury of the sweat glands. It produces no particular disturbance until the patient is placed under conditions that should cause perspiration. The treatment should be stimulation of the sweat glands of the skin with pilocarpine, warm baths and massage. Do not resort to pilocarpine until a thorough use of the other remedies has failed to give relief.

Hyperidrosis (Excessive Sweat).—This is a disturbance of the sweat glands in which the secretion of perspiration is excessive. Under many conditions a large amount of sweat is normal. All persons should perspire freely after severe exercise, after drinking much cold water, and when under the influence of strong emotions. Excessive sweating is most common in the palms, soles and axillæ. Wherever it is very frequent and profuse it is associated with enfeebled condition and want of general tone. The horny layer of the skin of the parts affected has a translucent, lusterless appearance, due to its softening. When long continued, the softened epidermis loosens and peels off in flakes, especially on the soles, causing discomfort. The borders of the soles are reddened and, in case there is much walking, blisters sometimes form.

Treatment.—Wet the affected parts with alcohol, containing one per cent of quinine, then rub upon them powdered starch or, what is better, subnitrate of bismuth. If the trouble be with the feet, sprinkle bismuth freely in the stockings also. Another good treatment consists of soaking the feet in warm water, then pouring over them a strong solution of salicylic acid, afterward rubbing them with one part powdered boric acid in five parts of talc. It is well to have several pairs of cork insoles for the shoes, that a fresh pair may be used every day. Each night take from the shoes those worn through the day and, having disinfected them, lay them away to dry. The soldiers of the German army rub their soles each night with a two-per-cent ointment of salicylic acid and mutton tallow, to check perspiration and toughen the skin.

Bromidrosis. (Offensive Sweat).—This affection is a derangement of the functions of the sweat glands in which the perspiration has an offensive odor. It may be sweet, or sour like that of beer, or of freshly baked bread, or wet straw. The offensiveness is due to decomposition of the macerated portions of the scarf skin and of the sweat after its excretion. As the perspiration of different persons differs in composition and quantity, its decomposition products will vary in character and odor. The surfaces affected have a soaked and sodden appearance.

The bromidrosis most often demanding attention is that of the feet and axillæ. The feet of some young people, whose occupations require much standing or walking, perspire very freely and, in bad cases, the resulting odor is so penetrating as to be offensive, even through the shoes, so that the patient is forced to shun society and is unfitted for many indoor vocations.

Treatment.—After thoroughly washing with plenty of soap, one grain of bichloride of mercury in a pint of water is generally effectual, for, by destroying the germs of putrefaction, it destroys the odors. It should be rubbed over the offending parts with a soft cloth, morning and evening.

PRURITIS ANI.

(Itching Piles.)

Pruritus ani, or itching piles, is of rare occurrence in youth. It is frequent among the aged, especially those of a nervous condition, and the uncleanly, and is very common during middle life, when people are most prone to excessive table indulgence. From

overfeeding and lack of sufficient muscular exercise there is disturbance of the general circulation, especially where the blood vessels are dependent, as in the anal region. Fullness of the veins results and, where there is fullness of veins, there frequently is weeping of the tissues, accompanied by more or less itching and tendency to scratching. If this condition be continued for any considerable time, the skin around the anus becomes thickened, and often striated (gathered in folds). From the scratching, small, red papules or points, seated in the papillary layer of the skin, arise in the folds.

The affection gives little trouble through the day, but at night, when the patient disrobes and cooler air strikes the body, the altered temperature lights up the irritation and the itching becomes almost unbearable, and he scratches for relief. In this way he may be kept awake for hours, until the temperature of the bed having become the same as that of the body the irritation gradually subsides. In such cases there is likely to be imperfect metabolic action (a clogged circulation in the liver and spleen).

This condition is best relieved by a teaspoonful of sulphate of soda and ten drops of tincture of *nux vomica*, in a glass of water at bedtime, which should cause a free evacuation of the bowels the next morning.

For the irritation at the anus, five grains of menthol to the ounce of vaseline, applied after thoroughly washing the parts and drying with a soft towel, relieves the itching and is a good remedy. To get rid of the thickened condition of the skin, equal parts of ichthyol and vaseline should be used every night until the skin is softened, when the excess of cuticle may be scraped away with a curette or dull knife, after which the ichthyol should be continued until the parts become normal. Worry and anxiety should be prevented and physical exercise regulated. With these measures, elate the patient by promising a certain cure.

Symptoms similar to those of itching piles are sometimes due to the presence of seat worms, in which case a sharp cathartic and injections of quassia tea will bring relief. (See Intestinal Parasites.)

CHAPTER IV.

THE HAIR.

A hair is an appendage of the skin and has two parts, the shaft and the root. The transparent investment covering the shaft and root is called the cuticle. Each hair is implanted in a sack or pouch, which is called a follicle, is composed of connective tissue, is formed from the skin and sometimes involves the subdermic connective tissue layer. It opens by a mouth upon the outer surface of the skin, and has a neck and a constricted part just below the papillary layer, where the duct of the sebaceous gland enters, and ends in a wide base or extremity. It is really a dipping down of the papillary and reticular layers of the skin to form a deep receptacle for the bulb-like root of the hair. Growing from the central and lowest part of the follicle is found a papilla, where this root is implanted. The follicle itself has two parts, an external and an epidermic coat.

The external coat consists of connective tissue and has arteries, veins, and nerves, and to this coat are attached the hair muscles. The epidermic coat is formed by a turning inward of the rete (reticular layer). The horny layer of the skin reaches down only to the opening of the sebaceous gland, but the mucous layer continues down to the papilla. The papilla is a connective tissue formation and is joined to the main body of the true skin, through the bottom of the follicle, by a pedicle in which are blood vessels for carrying nutrition. The papilla of a hair follicle contains many pigmented and non-pigmented corpuscles, also blood vessels, which at the apex form a loop similar to those in a derma papilla.

The root sheath is made of two membranes. The outer one consists of finely granular pale cells with very indistinct nuclei. The inner layer is more coarsely granular and has shorter and broader many sided cells with distinct nuclei. The sheath extends from the opening of the sebaceous gland down to the hair bulb, which is constituted by the reduplication of the inner layer in the bottom of the follicle, where it surrounds the papilla. The hair

is produced from this root sheath. It begins to develop about the third month of fetal life, and rises from the central portion of the sheath. The formation of the root is analogous to that of the horny layer of the epidermis from the rete.

The color of the hair depends not alone upon pigment, but also upon the presence of air bubbles. Blond hair is usually lacking in pigment. Curl in the hair depends partly upon the curve of implantation beneath the skin, and partly upon its shape. Straight hair is round and curly hair is elliptical, sometimes flat. The hairs upon the head are estimated at 1,000 per square inch, or about 120,000 in all.

Care of the Hair.—The health of the hair requires light and air, hence heavy, unventilated hats are bad. Constant and severe mental strain and anxiety may cause baldness. Harsh and powerful chemicals, such as are often used in shampoos, are very injurious. Use only soaps of finest quality. The white of an egg and warm soft water make an excellent shampoo, but a better one is made of pure soft water and castile soap. It should be used often, after which rinse thoroughly and dry the scalp with towels.

The regular use of pomades upon the scalp is unwise. They are dirty, soon become rancid, emitting a foul odor unless overcome by a strong perfume, and soil all with which the head comes in contact. Oiling the hair is unnecessary and a filthy habit. Sousing the head frequently in water is also bad. Use a dry brush freely every day and keep the scalp clean and healthy, and nature will supply what oil is needed.

It sometimes happens that the hair from improper treatment, general physical debility, or other causes, becomes dry, brittle and apparently lifeless. The following tonic may then be rubbed on the scalp each morning:

Sulphate of quinine.....	twenty grains
Enough dilute sulphuric acid to dissolve the quinine.	
Tincture of cantharides.....	two drams
Hazeline and glycerin.....	each, one ounce
Water of orange flowers.....	eight ounces

Hair Dyes.—Dyes are a disadvantage and injury to the hair. When used once they must be continued or the growth of the hair will reveal the true color at the roots, while the dyed portion tells of the vanity of the possessor. Better let dyes alone, but, if

one must be had, the following is as good as any: Saturate the hair with a solution of nitrate of silver, five to ten grains to an ounce of distilled water, and let the hair dry in the sun. Applying a solution of sulphuret of potash, twenty to a hundred grains to the ounce of water, hastens the process.

ALOPECIA.

(Baldness.)

By alopecia is meant loss of hair, either partial or complete. There are various forms of this disease, of which the most important for our consideration are:

1. *Congenital Alopecia* in which the tendency to baldness is hereditary. This is not very common, although a scanty growth of hair is a family peculiarity very often seen. When loss of hair begins with a person, one or more of whose ancestors were bald, the prospect is discouraging, for although it seldom goes on to total baldness, no remedy yet discovered seems to have much influence in checking its progress.

2. *Premature Alopecia*. Excepting the congenital cases, loss of hair from natural causes before forty-five years of age is known as premature alopecia. There may be, or there may not be, external signs as to the cause. Anything that arrests the growth of the hair will lead to it. The natural life of a hair is thought to be from two to six years, after which it drops out, hence, unless the growth of the new hair is maintained to take the place of the old, the daily shedding of old hairs will soon result in baldness, more or less complete, according to the area involved by the abnormal condition.

It is very likely to follow severe attacks of fever or other illness that greatly reduces the system, and sometimes results from nervous shocks, also from intense mental activity and anxiety, in which cases it may be permanent, but is likely to prove only temporary, the hair resuming its normal growth as soon as the system regains a healthy activity.

The most frequent local cause of this form of alopecia is dry seborrhea of the scalp, a disease said to be the principal cause of all baldness in women and occurring in them more frequently than in men. Among other local causes are ringworm of the scalp, erysipelas, small-pox and eczema, in fact, any disease long and severely affecting the scalp, also syphilis, and injury to the scalp, as from a bruise, bee-sting or friction.

Treatment.—This must consist of the removal of the cause if it can be ascertained. More can be done by restoring the health to the best possible condition than in any other way. The use of pilocarpine and jaborandi internally and externally, is recommended by some. Lassar gives the following formula:

Pilocarpine hydrochlorate.....	thirty grains
Vaseline	five drams
Lanoline	two ounces
Oil of lavender.....	thirty grains

Cottle gives this formula:

Acetic acid.....	one-half ounce
Pulverized borax.....	one dram
Glycerin	three drams
Spirits of wine.....	one-half ounce
Rose water.....	eight ounces

He also uses ammonia as follows:

Liquor acetate of ammonia.....	two ounces
Carbonate of ammonia.....	one-half dram
Glycerin	three drams
Water sambucus.....	eight ounces

Apply to the scalp two or three times a day.

The prevention of baldness is generally much easier than its cure; to this end the scalp should be kept clean by shampooing once or twice a month and by thorough brushing at least once every day, but this must not be carried to the extent of irritating the skin. The head should not be soused in water, unless it be followed by a careful drying of the scalp with towels. A fine-toothed comb should never be used upon the hair, either of children or adults; use instead a soft brush for children, a stiffer one for adults. The hair of girls as well as of boys should be kept short until they are eight years old. No attempt should be made to curl hair by the use of hot irons; kinking in curl-papers and similar devices also injures it.

3. *Senile Alopecia* is the baldness that comes after forty-five. It may begin at the forehead and work back, but usually commences on the back part of the apex of the head and spreads in all directions, though it does not usually extend over the entire scalp. It is thought to be the first indication of the lessened

vitality of advancing years, and is much more common in men than in women. It very rarely affects the beard, but may extend to the pubic region. There is very little use of trying to treat this form of alopecia. No remedy is known for it, and the loss of hair is permanent.

4. *Alopecia Areata* is a form of baldness which appears suddenly in one or more small circumscribed patches upon an apparently healthy skin. A slight itching or feeling of tension in the spots may precede, but usually there are no premonitory symptoms, and the appearance of a bald patch the size of a dime or larger is the first indication that anything is wrong. The spots are very white and smooth and a little depressed below the surrounding skin. Having thus begun, the disorder may spread until every hair on the body is removed, but generally after spreading a little goes no further.

Its cause is not known. By some it is believed to result from disordered nerves; others maintain that it is the work of an exceedingly minute parasite and that, although good lenses and patient investigation have thus far failed to discover it, the phenomena attending the disease can be explained in no other way.

Fortunately the loss of hair from this form of alopecia is not often permanent, but after a time, varying from a few weeks to ten or more years, the hair is likely to grow again in the bald places, and in many cases it will be as thick and luxuriant as before the attack. Persons less than forty years old nearly always regain their hair and many do at a much more advanced age, but the probability of their doing so diminishes as their years increase. The history of an early loss of hair by the ancestors is an unfavorable indication in this as well as in other forms of alopecia, but is by no means a positive sign that the patient will not fully recover.

Treatment.—It is thought that internal remedies have very little effect, but hair growth is known to be stimulated by perfect health of the body, and for this reason as well as countless others, the general health should be made as perfect as possible. Alopecia areata tends to spontaneous recovery, and in many cases the hair will grow again without any treatment, hence it is never known whether the use of a remedy hastens the process, but the majority of authorities advise the use of such applications as will stimulate the scalp. For this purpose Crocker recommends

chrysarobin ointment—a dram of the chrysarobin to the ounce of lard—rubbing it into the skin of the bald patches well and thoroughly night and morning. Its irritation of the patch, however, is liable to extend so far as to alarm the patient, and this is the chief objection to its use. It must not be used near the eyes in any case.

Bisquet recommends that the hair be cut short and frequently disinfected by a strong solution of carbolic acid, that the scalp be kept dry at all other times, that the patches be treated with one part cinnamon oil to three parts sulphuric ether, and that when the slight redness thus produced disappears, the oil and ether be applied again. It is a germicide and excludes the air.

Later, when the hair has ceased to fall out, the following recommended by Wilson is likely to do well:

Strong ammonia liquor.....	four drams
Chloroform	four drams
Oil of sesamum.....	four drams
Oil of lemon.....	one-half dram
Spirits of rosemary.....	four ounces

Apply once or twice a day.

Crocker advises the use of:

Perchloride of mercury.....	two to five grains
Brandy	one dram
Oil of turpentine.....	seven drams

To be rubbed into and around the patches night and morning.

VENEREAL DISEASES.

By R. E. McVEY, M.D.

SYPHILIS.

(Pox.)

An enumeration of the causes of suffering is often unpleasant, but doubly so when the evils under discussion are venereal diseases, for a correct understanding of which it is necessary to call attention to the loathsome acts by which they are chiefly disseminated. Would that, in a popular work for the home, the consideration of this class of subjects might be omitted, but these dreadful penalties for broken law are so widespread and alarmingly frequent, as every physician of even limited practice will testify, and the first advances toward ruin are so often made ignorantly, we should fail in our duty to the rising generation did we not, by pointing out these dangers, show to the innocent some of the fearful consequences very likely to result from any turning aside from virtue; for if inoculation should not occur at the first transgression, when the line has once been crossed, the barrier between purity and vice been broken, the weakened offender, robbed of self-respect and the restraints of conscience, will sin again and again, until chancroid, gonorrhea and syphilis may be among only the milder of the retributive consequences. The social evil is the greatest blot of our times; and can it be explained on any other hypothesis than that of ignorance that thousands of bright young people should annually enter upon lives of shame, so surely and quickly leading to dishonor, disease and death? Shall we not, rather, let them know, while pure and innocent and before it is too late, where the uncurbed passions lead, and that verily it is the first step that costs?

And the warnings should not stop here, for of all diseases syphilis is the most transmissible to offspring, and the most fruitful cause of miscarriage, abortion and infantile mortality. Those affected with this awful malady should not be allowed to marry until time and treatment have thoroughly done their cleansing work, a

process usually accomplished in four years of vigorous continued medication, although instances are not wanting in which men, infected and supposedly cured in early life, after twenty years of apparent freedom from the disease have begotten syphilitic children. Every syphilitic husband should be plainly told that "he may infect his wife directly by sexual contact, or indirectly through the medium of the fetus, and that if she fails to abort, she may be delivered at term"* of a wasted, wizened, deformed, feeble, snuffling, blotchy child—blasted from the beginning—which, if it does not die within a few months after birth, as nearly 50% of all such infants do, is likely to succeed to a stunted development, mental incapacity, and a heritage worse than death. "Every wife should be informed that by permitting the approaches of a syphilitic husband she herself becomes liable to the disease," and to a mother's share in the creation of such a being as just described; and all adults should so fully understand the possibilities of contamination as to be able to intelligently protect themselves, their children and friends from all indirect infection, as from servants, playmates, soiled bedding, towels and utensils of every kind.

Syphilis is a very chronic as well as contagious disease. The mildness or severity of its manifestations, their multiplicity, succession and duration, depend in great measure upon the constitutional peculiarities of the patient. It has long been supposed to be of microbic origin, but, though many skillful investigators have made patient search for it, the germ has not been found. While we hope to give a good general idea of syphilis, and such information as shall serve as a note of warning, we shall not in the limited space at our disposal attempt its full discussion. The complete course of the disease consists of three parts: The Primary, Secondary and Tertiary Stages.

The Primary Stage has been defined as the time during which the force of the disease seems to be concentrated at the point of infection, and in the adjacent lymphatic glands. When syphilitic virus is introduced into the system, there is no appreciable sign of its action until from twenty to thirty days, or more, when a single sore, called the primary sore, chancre, or initial lesion, appears upon the skin or mucous membrane at or very near the place where the virus entered. If inoculation occurred at more than one place, there will be more than one such sore. The chancre is

* Genito-Urinary and Venereal Diseases, by White and Martin, D. Appleton & Co.

round or oval, usually ranges in size from a pin's head to a dime, and has a dark red, somewhat depressed base, around which, especially in men, the tissues are apt to be firm and hard. Unless irritated, this ulcer does not suppurate, but discharges a small quantity of thin serous secretion which is very contagious. Unless the constitutional condition of the patient is bad, this ulceration is not likely to go very deep. It is not painful, and usually in three or four weeks disappears.

At the same time that the chancre is developing, the lymph vessels and lymph glands of the adjacent parts become involved, swell and harden, and, extending back from the chancre, usually appear to the touch like hard, painless cords. With the subsidence of the chancre, these lymphatic enlargements, called syphilitic bubo, also disappear. The duration of this stage is from six to eight weeks, rarely longer.

An interval of from two weeks to six months now follows, and as the general health has not been impaired, the patient may think that he is entirely free from the trouble, but is likely to find later that the poison has been slowly extending to the other lymph glands and spreading through his system. Whether in the first place the poison enters through the lymphatic vessels or through the blood vessels is uncertain, but it is probable that the blood is infected through the lymph by way of the thoracic duct. As the blood becomes infected its red corpuscles are diminished, and its white ones increased in number, and the entire system, especially the skin, becomes saturated with the poison.

The Secondary Stage.—This and the tertiary stage, and the interval between them, make up the period during which the disease is known as constitutional syphilis, because by the beginning of the secondary stage the body has become so thoroughly impregnated with the virus.

In some cases the first manifestation of this stage is a red blush or rash, which, appearing mainly upon the chest, belly and other parts covered by the clothing, and causing no itching or pain, may escape the patient's notice and pass off without his being aware of any secondary symptoms, the disease having exhausted itself without making any further skin manifestations. In such a case we cannot be sure that the patient has had constitutional syphilis.

When preceding the rash there has been fever, accompanied

by pains, aching in the bones, and other neuralgic symptoms, and, perhaps, enlargement of the lymphatics, we expect the first blush will be followed by the papular form of the eruption upon the skin, which is the typical form of this secondary manifestation; there is, however, great variety in the character and severity of the eruptions in different cases. The papular eruption involves the deeper layers of the skin, and usually makes its appearance in from three to four months after the initial lesion. Its duration is from six months to two years. It is not likely to be painful, nor, except upon the hairy parts, to cause much itching. At first it is of a dark red hue, having the appearance of the chancre, but gradually changes to a paler color and assumes a more coppery or lean ham appearance.

The moist papules are of special importance, though they are only ordinary papules transformed. Their transformation is due to their location, papular development being favored by fineness of skin, thin epidermis, and the moisture of secretions or excretions—conditions which are found at the junctures of the skin with mucous membrane. Upon the skin side a papule is often dry and scaly, while upon the mucous side its covering is softened by moisture and transformed into a grayish white, easily detachable membrane. In the mucous membrane of the mouth or throat these moist papules are known as mucous plaques or patches, and occur upon the inner surface of the cheek, at the juncture of the tonsil with the pharynx, sometimes on the tonsil, tongue, or lips. They are sometimes so large as to spread over a large part of the tongue; they have red bases, are somewhat circumscribed, and gray in appearance, as if they had been touched with a stick of silver nitrate. See Figs. 1 and 2, Plate IX.

These mucous patches arrive early in the secondary stage, sometimes even before the skin eruption, and are the most constantly present of all the lesions of secondary syphilis, are quite diagnostic of the constitutional infection, and very contagious. What is known as innocent syphilis is conveyed by them, and on this account great care should be taken about kissing. The custom may well be confined to special friends who are known to be pure. Much danger lurks in public drinking cups; if obliged to use them, always rinse thoroughly before putting them to the lips. In view of the fact that this, as well as many other most serious diseases, may be disseminated by such means, what can



FIG. 1.



FIG. 2.

Figs. 1 and 2. Mucous Patches of Secondary Syphilis.

PLATE IX.

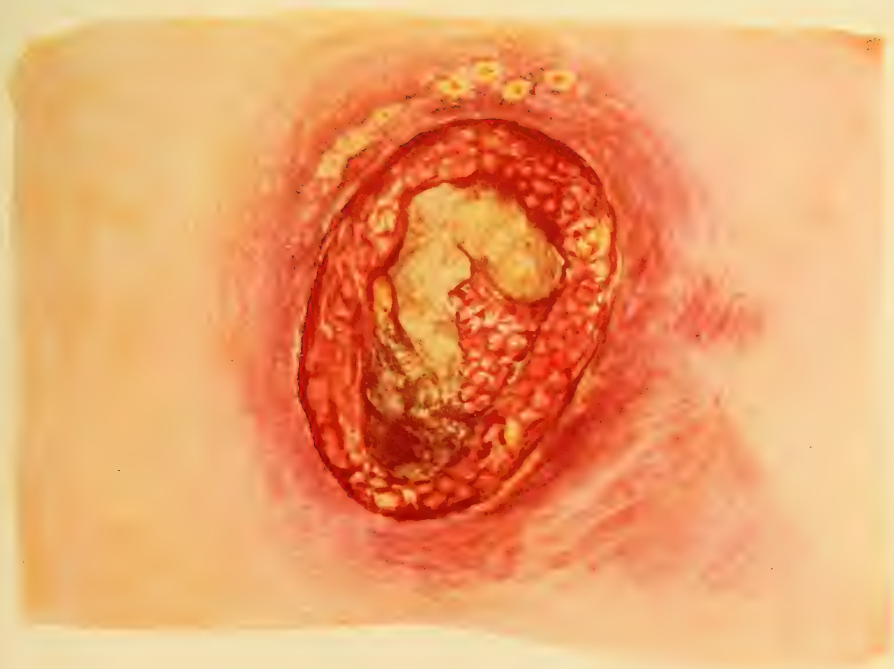


FIG. 3.

FIG. 3. A Gummatous Ulcer of Tertiary Syphilis.

be too strong a condemnation of the custom in many of our schools of using public books and pencils, indiscriminately passing them from one pupil to another?

Innocent syphilis may also be obtained by a wife from her infected husband, by a husband from his wife, by a wet nurse from a syphilitic child, by a healthy child from a syphilitic nurse, or from a healthy nurse who at the same time is also nursing a syphilitic child, or by any person, through any agency, such as an infected towel, brush, razor, pipe, knife, fork, bath tub, or privy seat, whereby virus from a syphilitic ulcer may be conveyed to a scratch or abraded spot upon his skin. The blood of a patient suffering from constitutional syphilis will also impart the contagion.

It may thus be seen that there are many ways of obtaining this disease, but the great majority of cases are acquired through impure sexual congress, so great, indeed, that but for this method of dissemination, syphilis, in a few generations, could be banished from the earth.

In cases acquired through kissing, the initial lesion will be found on one of the lips, and will be readily transformed into a mucous patch, which may continue through the entire secondary period of the disease, with tendencies to relapse. The changes which occur in the mucous patches are of the same general nature as those in the papules upon the skin, but the chronological order in which these patches appear is by no means as regular as in the skin manifestations.

The Tertiary Stage.—From the best information on the subject, a large per cent of syphilitic cases terminate with the secondary symptoms, the disease having been overcome by the vital forces of the body. About seven per cent of all cases, however, pass into the tertiary stage. When this stage is reached the disease has so lost its constitutional characteristics, that its manifestations are localized. This statement is difficult to harmonize with the accepted theories of the primary and secondary stages. The important factor in the first stage is probably a germ. The manifestations of the tertiary stage cannot be reconciled with the presence of a germ, as in the first two stages. The impress of the disease has been more intense in some parts of the body than in others, and we have proliferation of connective tissue cells, which, losing their vitality while maturing, break down into the

gummatous ulcer, or gumma, so-called because its contents resemble gum. When these formations are situated upon the skin, and often when upon a mucous membrane, they form large indolent ulcers with sharp cut-out edges surrounded by swollen, hardened, inflamed tissue, affording little pain and varying greatly in size and appearance, according to the peculiar bodily conditions of the patient. Such a gumma is shown in Fig. 3, plate IX. They may appear upon any part of the surface, but their favorite sites are the face, arms, the upper front portions of the legs, the breast, scrotum, penis, and the external genital organs of women. They may be single or multiple. When two or more are near together they are likely to unite, forming one large irregular-shaped sore. Any mucous membrane may likewise become the site of a gummatous ulcer, but the throat, vagina, urethra, inner surface of the prepuce, the labia and the anus are, perhaps, most often thus affected; they are also quite frequently found in the nose and the rectum; in fact, any part of the alimentary canal may be visited in this manner.

The muscular gummata are those formed deep in the tissues, and instead of becoming soft in the center and ulcerating, remain hard, increasing in size until they sometimes become larger than a full grown lemon.

They are liable to form in the liver, mesentery, spleen, lungs, heart, arteries, spinal cord, brain; in short, no organ of the body is exempt from them. Ulceration of the bones is also a manifestation of tertiary syphilis.

The diagnosis of syphilis in the primary and secondary forms is not usually difficult, but this is not true of the tertiary stage, unless there are scars from the primary or secondary lesions. It may rarely happen that a patient has had the first stages of syphilis without knowing it, and in such an instance it is very difficult to get a history of the case that is satisfactory. Many obscure infectious symptoms, which also belong to the non-syphilitic, may be found in those who have had syphilis, and the difficulty now comes up, whether to attribute these vague symptoms to a syphilitic taint or to some other cause. The prospects for recovery in syphilis are very good in the majority of cases, but not so in those showing the brain and nervous manifestations. There are very few deaths, in the acquired cases, arising from the circumscribed gummatous form seen in the later stage of the disease.

Treatment.—First local. At the first appearance of the chancre the diagnosis is quite uncertain until after the drying or hardening takes place. Simultaneous with this hardening the lymphatic glands in the groin or axilla become inflamed and enlarged. This occurs about the beginning of the second week. A solution composed of one part of the bichloride of mercury to one thousand parts of water may be injected hypodermically under the chancre, or the chancre may be treated by electrolysis, if thought to be a local disease, but in other cases treatment by mercury should not begin until the appearance of the second stage of the disease. It should be remembered that mercury is not eliminated from the system in less than six months from its inception, and the poisonous effects of this remedy should be thoroughly understood. These effects are first seen by alterations in the character of the saliva, which becomes increased and stringy. When the system becomes saturated with mercury, there is a metallic taste in the mouth and a strong, offensive breath.

Slow mercurial poisoning gives rise to nervous troubles, trembling in the muscles, sclerotic plaques in the brain and spinal cord, convulsive phenomena, epileptic attacks, choreic and apoplectic symptoms, paralysis and disturbances of sensibility—results more serious than syphilis itself. If with a one to one thousand solution of bichloride of mercury, we mix an equal quantity of syphilitic virus, the virus is rendered harmless. Many eminent authorities agree that mercury cures syphilis, but, by common consent of the profession, the large doses, as formerly given, have been discarded and succeeded by small and more frequent ones.

Perhaps the best form of mercury for syphilis is mercury with chalk (*hydrargyrum cum creta*). Where there is debility, combine with this a little quinine, giving a grain of each three times a day, and, if it produces griping or intestinal disturbances of any kind, add a grain of opium to each dose. If mercury in any form produces griping or diarrhea, it may be combined with opium. Never take mercury continuously. If the dose of syphilitic poison has been heavy and the constitutional symptoms are plain, continue the treatment twenty days, then stop ten. If the constitutional symptoms are slight, continue the treatment ten days, then leave off twenty. Never forget the serious danger of taking into the system too much of this powerful drug. I would rather have syphilis and trust to the resources of the system to eliminate and

cure the disease, than be treated for syphilis by an inexperienced physician who does not see his way clearly in reference to its elimination, the character of his remedies, and their subsequent effects.

Great patience, as well as careful treatment, is required; and it is in this that many patients make very costly mistakes. Because the eruption has disappeared and the general health is not impaired, they conclude that they are rid of the poison and quit the remedies. Experience has shown that the mercury, as above indicated, should be taken for two years; then during the first six months after the two years, what is called the mixed treatment should be taken, according to the following formula:

Bichloride of mercury.....	two grains
Iodide of potassium.....	four drams
Tincture of gentian compound.....	four ounces
Dose for an adult, a teaspoonful three times a day.	

After six months of this treatment the iodide of potassium should be taken alone. There is quite a difference of opinion in the profession as to the amount of the iodide that should be given from day to day. I do not think it should exceed three drams per day—three doses of one dram each.

In the tertiary stage, if there be any uncertainty as to the symptoms being caused by the syphilitic virus, the tolerance of the iodide is considered evidence of the continuance of the disease, for were it not for the presence of the virus the system would revolt and the indications of iodide poisoning would appear. It is not quite settled as to how the iodide acts in removing the disease, but it is probable that the mercury destroys the germ or virus during the active stages, and that the iodide causes the elimination both of the mercury and the virus debris.

The best method of taking the iodide is to combine an ounce of iodide with an ounce of water, and commence with a small dose, from five to ten drops, and increase it one drop each time until a dram three times a day is reached. The circumscribed gumma usually melts away under this treatment.

The diffuse form, as found in the brain and spinal cord, does not yield to the iodides, and the question to decide is whether the patient is suffering from local effects of the syphilis, or from the mercury that has been absorbed. It may be with the mercury in-

stead of the syphilis that we have now to contend, in which case there is still hope. I have in these cases used one-sixtieth of a grain of strychnia and three or four drops of dilute phosphoric acid after meals. This quickens the action of the cells in the brain and spinal cord, producing a more healthy action, invigorating them, and serving all purposes better than the iodides.

The best authorities agree that only the brain and nervous forms of syphilis are incurable. I believe it to be a disease of self-limitation and that a large percentage of the cases will recover without any treatment, but, as no one can foretell which cases will terminate so happily, it would not be good practice to rely upon this. Had I syphilitic iritis, I would be slow to let anyone operate upon my eye. Such an operation is attended by such great danger that it is safer to trust to nature's forces to throw off the disease.

The old method of excision of the chancre has been discarded, for the virus was too often found to have already spread beyond the points that could be reached by the knife. Let no man give you mercury in the tertiary stage. Remember that the chancre belongs to the primary, the papule to the secondary, and the gumma to the tertiary stage.

In Spain they do not use mercury. The climate alone seems to cure the disease, and during the seventeenth century, when mercury failed, the patient was sent to that country. In the United States, the various hot springs are the resort of all seriously syphilized patients. Hot water baths, ranging in temperature from 98 degrees to 104 degrees Fahrenheit, by stimulating perspiration and the other excretions, greatly aid, especially in the elimination of mercury, from those who have been heavily dosed with the drug, but excellent authorities have found hot air baths, from 175 degrees to 200 degrees, and lasting from fifteen to twenty minutes, more valuable than hot water. They can be taken very easily in nearly the same way as described in this work under the head of vapor baths, but it must not be forgotten that baths alone will not cure syphilis. No matter how great the benefit thus derived, or how well the patient may feel for a little while following, the medication must be continued the full time to completely eradicate the poison from the system. The administration of mercurial vapor baths was never satisfactory, and is no longer considered good practice.

Probably no other class of unfortunates are so often imposed upon, so financially bled, as those suffering from venereal diseases. Stung by remorse, fearing exposure, and alarmed by vague terrors, they become the easy victims of extortionate quacks and advertising charlatans. Next in importance to knowing that the only sure way of escaping the greatest danger of becoming infected is in living an absolutely pure life, is the knowledge that your own faithful and reliable family physician is the one to receive your fullest confidence as soon as you learn that anything is wrong. In the hands of no one else will you be as safe, for he will neither betray nor rob you, will be accessible at all times for counsel and guidance through the years of treatment which must follow, and is likely to be far more competent and skillful than the traveling mountebank who is unable to succeed by building up a practice where he is known.

GONORRHEA.

(Clap.)

Gonorrhea is a specific disease, contagious, and communicated through impure contact between the sexes. It is considered a local disease, caused by the germ gonococcus, which, in the male, insinuates itself within the mucous membrane of the urethra, where it causes an inflammation, either mechanically from its presence, or by a ptomain. In the earlier stages of the infection, the disease is confined to the outer openings of the genital tract, but often the deeper portions are soon invaded, especially in the chronic forms of the disease.

In the male the membranous and prostatic portions of the urethra, and frequently the testicles, are involved by absorption. There is likely to be swelling, redness and soreness, and sometimes pain in the penis. The germ is also frequently found in the bladder and the pelvis of the kidney. The virus may be absorbed and taken up by the serous membranes of the joints, as is frequently seen in gonorrheal rheumatism in the ankles, knees, etc. It is also found in the heart.

In the female the gonococcus is not confined to the urethra, being often found in the mucous membrane of the vagina, but the inflammation is not likely to cause her nearly as much trouble and anxiety as occurs in male patients. The uterus is involved, and especially the Fallopian tubes, where it is known as pyosalpinx.

When these tubes become affected there may be a discharge of pus for many years.

In the urethra of the male the inflammation often results in contractions of the canal, which are known as strictures. These are found about one and a half inches from the mouth of the urethra, also in the membranous part of that organ. In the chronic form the inflammation in the prostatic portion of the urethra may be very slow and mild, continuing many years, with more or less pain during urination, finally in old age resulting in obstruction of the urine and chronic inflammation of the bladder.

Symptoms.—In from three to five days after the impure contact the first symptom appears and is a distressing itching near the meatus of the urethra, with more or less burning during urination, which, in a short time, is followed by a peculiar yellowish, muco-purulent discharge, which, in the typical form of the disease, continues three months, in some cases a year. There is an abortive form, which may not be specific and is the result of leucorrhœal discharge, which may continue only a few days or a week, then disappear. One having gonorrhea, after handling the parts, should always wash the hands with soap, or some disinfectant, to avoid infecting the eyes, for the germ or virus introduced into the eye produces gonorrhœal ophthalmia, an inflammation which soon results in destruction of the tissues and total blindness. The patient should be quarantined from the other members of the family and his clothing should always be thoroughly disinfected before being handled or sent to the wash.

Treatment.—In the beginning the urethra should be injected by a fountain syringe with a saturated solution of boric acid, every morning and evening for two or three weeks. If there be no improvement, nitrate of silver may be used instead of the acid, from one to two grains to the ounce of water, injected in the same way. Where inflammation in the urethra is very intense it is sometimes better to use a solution of subnitrate of bismuth, one dram to the ounce of distilled water. It coats the irritated parts and has a very soothing effect. It should be used after urination. Sulphate of zinc and golden seal may be used when the inflammation is not so great.

Constitutionally.—During the first three or four weeks benzoate of soda, five grains every four hours, should be given. It is an antiseptic and keeps the bladder, kidneys and urethra antiseptic.

Formerly balsam of copevia was used in teaspoonful doses three times a day. It is a valuable remedy, but sometimes overstimulates the kidneys and produces a rash upon the skin which alarms the patient. Strictures are best relieved by dilators. The diet should be light and unstimulating, and quiet rest in bed is important during the period of most active inflammation. The treatment for gonorrhea must often be continued faithfully for one or two years, and must be varied from time to time as the symptoms indicate. Sometimes the removal of testicles, or ovaries and Fallopian tubes, is necessary to save life. Place no confidence in remedies advertised to "knock it in three days." There are comparatively harmless forms of urethral inflammation that are easily overcome, but only thorough and persistent treatment—long and intelligently administered—cures gonorrhea.

MASTURBATION.

(Onanism. Self-abuse. Self-pollution.)

Masturbation (from *manus*, a hand; *stupro*, to commit adultery.) "The excitation of the genital organs by rubbing and titillating them with the hand, or other instrument; a horrid vice, productive of the most serious disturbances of the nervous system, and derangement of health."—Hoblyn's Med. Dictionary.

The problem of self-abuse depends upon acuteness of sensibility. We find the evil confined principally to youths whose sensibilities are more or less blunted, so that, from dullness of perception, possibly from ignorance, they are unable to measure the consequences of the habit.

Sexual desire at first is usually very strong and the passions more or less wild and undisciplined, but those of clear understanding will control and correct them. It is only the stupid who, informed as to results, will let libidinous thoughts run unchecked until the roused passions seek relief through self-abuse. The intellectual boy or girl, knowing the relations of cause and effect, and equipped with fair common sense, will hold these instincts and thoughts in abeyance.

This is easy at first, but sexual passion, like thirst for rum, if left uncurbed, becomes a pitiless master and drives its slave through weakened organs, wasted vitality and loss of manhood to disease, despair and death.

Could every boy and girl—for either needs the warning as much as the other—just advancing into puberty be fully informed

as to the loss of self-respect, self-control, ambition and noble purpose following in the train of self-abuse; also as to the transmission and character of venereal diseases, their loathsomeness and the disgrace, suffering and terror they entail, and be shown how large a part of the insanity in the world is the fruit of improper sexual indulgence, it is certain that fewer would be ruined.

The guardian, more than the child, is to blame for vicious habits contracted through ignorance, but their curse to the victim is no less damning. Masturbation, lewdness and adultery are increasing in this country. When will people awake to the gravity of this matter? Parents who shrink from a confidential and full explanation to their children, at the proper time, of newly developing instincts and powers, their purpose, use and abuse, should at least place in their hands good books upon the subject that they may acquire a correct understanding of these most important tendencies and passions affecting character and health, rather than leave them to pick up fragmentary knowledge and distorted facts from impure companions at school and on the street.

Masturbation at first produces no change in the genital organs. In healthy young men there is more or less plethora of the seminal vesicles, resulting in occasional emissions or night losses. This is the natural condition, but if the sexual impulse be indulged too often it not only becomes a ruling passion, but pathological alterations result, the nervous system is exhausted and there is loss of equilibrium in the cells of the spinal center. When the nerves which are distributed to the seminal vesicles and the prostate are exhausted there is more or less irritability in those parts, rendering them liable to congestion and chronic inflammation. When these vesicles become supersensitive their normal contents, which are semen, cause irritability with ejaculation. This soon becomes involuntary and is known as spermatorrhea, which is accompanied by a train of ills leading to chronic invalidism, some of which are indigestion, constipation, dyspepsia, weak back, weakened and irregular action of the heart, enfeebled vision, varicocele and mental obtuseness.

Treatment.—The mind must be kept free from unclean thoughts. Associate only with those of pure character. Enlarge the mental scope by schools and libraries, or by good literature at home and by healthy occupation that will engross the thoughts.

Bathe the genitals with cold water on retiring at night, after

which keep the hands and all other excitants away from these organs and permit the mind to dwell only upon pure and elevating themes. By this treatment and fully controlling the habit the patient is restored to perfect health.

SEMINAL LOSSES.

From a healthy, vigorous man, though at the time leading a continent life, there may be emissions of semen during sleep. Great alarm is often experienced by a patient affected in this way, and he is frequently made the victim of most shameful imposition and fraud by so-called specialists, who, by taking advantage of his ignorance and fears, frighten him into such terror as to become an easy prey to trickery worse than robbery itself. Although nocturnal emissions usually occur only in those who have sometime been guilty of self-abuse or sexual excesses, or are in the habit of indulging in impure reveries, or mental unchastity, if the losses occur but once in ten or fifteen days they are rather in the nature of relief of overdistended organs than cause for alarm. They are most frequent at the age of greatest sexual activity and it is even claimed by some physicians that in well-fed persons who take little exercise they may sometimes be conducive to health.

It is, however, better to be free from them, for there is danger in their liability to increase in frequency until they become a habit very difficult to overcome, and a serious drain upon the system, but not until the losses occur so often as to cause feelings of prostration the next day, headache and general dullness, both physical and mental, is there need for seeking medical advice. It should then be obtained from your family physician, who will charge you only a reasonable price and is likely to be far more competent to prescribe for you than is the advertising quack, whose chief concern will be to frighten you into a course of treatment that will enable him to secure your purse.

One who takes vigorous exercise, lives temperately in all things, and does not allow his mind to dwell upon sexual thoughts, will be very rarely, if at all, troubled in this way. The loss usually, but not always, occurs during lascivious dreams. Keeping the thoughts pure while awake is the surest way of making the dreams pure. The character is the same while dreaming as while thinking. It is not only a duty to repress sexual thoughts and desires, but a privilege redounding greatly to the health and advantage of him who will be governed by this rule.

There is a tendency in all the functions of the body to establish habits and to act at regular intervals, and nocturnal emissions follow the general law. The oftener they occur the oftener they are likely to occur, until they become an almost uncontrollable habit, destructive alike of body and mind. The secret lies in breaking the habit; the sooner the easier and better for the patient.

Treatment.—In healthy men, losses occurring once a week can generally be overcome by avoiding hearty food, especially hearty suppers, discarding tea, coffee and tobacco, and sleeping on a reasonably hard bed, with only a moderate amount of covering. It is also a help to take but little drink in the evening, none after eight o'clock, and to empty the bladder just before retiring and as often through the night as the patient awakes.

He should rise early, not allowing himself to doze off into a second sleep, for it is in this second sleep that the emissions are most likely to occur. Acton says: "An early call, or an alarm clock, may cure many a patient better than all the medicines in the pharmacopeia. It is in early morning, while the bladder is full, that the loss takes place. The precaution of keeping the bladder empty at night is very important," but we can hardly exaggerate the importance of the will and keeping the thoughts pure, for incontinence of thought is a most powerful cause of irritation of the sexual organs. The mind must be kept clean to effect a cure.

One or two grains of monobromate of camphor, taken at bed-time, produces a soothing effect upon the vesicles, causing them to retain their contents. From ten to fifteen grains of bromide of potassium, taken every four hours through the day, the last dose at bed-time, may be used instead of the camphor and is a good remedy. Cold sponging of the whole body at bed-time often serves a good purpose, but sometimes bathing the genitals in cold water does as well. The patient should have abundant exercise in the open air, and his diet should consist of easily digestible food. When it agrees with the patient, milk is excellent.

This trouble may also arise from gravel or catarrh of the bladder, in which case the remedy lies in the removal of the cause. It may result from too great length and narrowness of the foreskin, making it difficult or impossible to uncover, wash and cleanse the glans penis. In this case circumcision, or some other surgical operation, is the remedy.

DISEASES OF THE NERVOUS SYSTEM.

By B. D. EASTMAN, M.D.

CHAPTER I.

INANIMATE MACHINERY.

A complicated, ingenious and successful piece of machinery excites everyone to admiration. Take the locomotive, for instance: Note its capacity for movement forward or backward; for going at a snail's pace or with the speed of the wind; for moving the lightest car or for hauling a heavily loaded train. How wonderful and various its capacities and powers. But after all the skill, experience, time and money spent in perfecting and building a locomotive, it is, if left to itself, an inert, ineffective, useless contrivance. It requires the services of a competent fireman to attend to its needs of water and fuel, a skilled engineer to direct, control and bring out its powers, and an experienced machinist's daily attention to keep it in repair. In short, the locomotive is powerless and useless, unless served and controlled by an intelligence which does not belong to itself and is wholly extraneous and foreign to it.

THE HUMAN MACHINE.

Compared with a locomotive, the human machine is far more delicate, complicated and wonderful. To be sure it cannot exert the force of an engine, but, in its range of capabilities, multitude of movements, and wonderful adaptation to complicated surroundings—viewed simply as a machine—it vastly exceeds the locomotive, as well as every other mechanical contrivance. But far and away, above and beyond the purely mechanical complexity and adaptability of the human machine, stands the wonderful, inherent, vital principle, by which the various complicated functions and processes of the body are controlled and carried on, and through which the human machine is rendered self-controlling, self-directing and self-repairing.

THE NERVOUS SYSTEM.

The different processes and functions of animal life are carried on and developed by various organs, to each of which is delegated certain duties. Thus, the countless movements of the body devolve upon the muscular system; the preparation of food, to fit it to minister to original growth and to repair the waste caused by vital action, is the duty of the stomach and other digestive organs; respiration is carried on by the lungs, circulation by the heart, and so on; but the highest, most complex and most important duty, namely, the regulating, controlling and directing of all the organs and functions, is confided to the *Nervous System*.

It is the nervous system which marks the distinction between the vegetable and animal kingdoms. Vegetable life, in common with animal life, is possessed of nutrition, circulation, growth and reproduction; but only animal life is endowed with a nervous system, controlling the various functions of the body and placing it in conscious communication with the outer world. The lower animals possess nervous systems, which, in some special directions, may exceed in acuteness the corresponding functions of the human organism, but they fall short of the latter in the completeness, perfection and development of their powers as a whole.

GRAY MATTER AND WHITE MATTER.

The nervous system, using the term in its widest sense, is composed of two varieties of nerve matter, called the gray matter and the white matter, each of which has its own functions and a structure peculiar to itself.

The Gray Matter is distinctively cellular in structure—that is, it is made up of very minute microscopic bodies called cells, which, in the main, are of an irregular, rounded form, with two, three, or more, long, slender projections, or processes, as they are called, by which they are connected with each other and with the nerve fibers. This gray matter, wherever found, has a tendency to gather itself into irregular somewhat globular form, and its functions are to receive impressions, act upon them and direct the activities.

The White Matter, although developed from cells, appears to be made up of long slender fibers, and its office is to carry impressions to and convey orders from the gray matter. These delicate fibers penetrate the gray matter and interlace with the

processes of the cells, thereby forming nervous connection with them.

The nervous system, thus constituted, is divided into several different parts; namely, the brain, which is contained within the skull; the spinal cord, situated in the spinal canal—the long, bony tube formed in the back bone or spinal column; the bundles of nerve fibers which radiate from the brain and cord; the specially developed ends of these nerves, called “end organs;” and certain connected nerves and nerve gatherings, called the sympathetic system and ganglions.

It is by means of these “end organs,” especially adapted to differing requirements, that we have the sense of touch and other special senses, that the stomach appreciates the presence of food and performs the function of digestion, and that the wants and needs of the body generally are made known to the central controlling power. Furthermore, that which places man far above all the brute creation, gives him his standing at the head of all earthly creations, and enables him to command so widely and successfully the resources of the mineral, vegetable and animal kingdoms, is his brain function, mind power, mentality. Mentality is the highest and most complex of nervous phenomena, and is a function of the brain, that part of the nervous system contained within the skull.

In the further consideration of this subject it will be conducive to convenience and clearness to consider:

First. The general anatomy of the whole nervous system, and its general functions.

Second. The functions and diseases of the nerves and nervous system (as distinguished from the brain).

Third. The functions and diseases of the brain itself, as connected with mere nervous action and, more especially, with mental action.

It will not be practicable to entirely separate these three divisions. They will unavoidably run into each other to some extent, but the classification is natural and desirable.

CEREBRO-SPINAL AXIS, CRANIAL AND SPINAL NERVES.

The central portion of the nervous system, consisting of the brain and spinal cord, is called the cerebro-spinal axis. At certain points along this axis bundles of nerve fibers emerge. Those

which appear to emerge from the brain are called cranial nerves; those from the spinal cord, spinal nerves. In general these nerves are bundles composed of two kinds of fibers, some nerves being of one kind, some of the other, while some are made up of both kinds. These two kinds of fibers have different functions. The one, which we may call the incoming nerve, is charged with conveying messages (sensations or impulses) from without inward. Through these nerves the central nervous organization receives impressions from without of pain, touch, heat, cold, location, pressure, weight, space, sight, hearing, smell and taste. Some only awaken latent energy in the spinal centers, and are called excitoreflex nerves, a term which will be explained hereafter.

The other nerve fibers are charged with carrying messages from within outward, and are called outgoing nerves. The nerves which carry impulses to the muscles are called motor nerves; those which affect the blood vessels, vaso-motor; those which control the action of the glands, secretory nerves; and those which regulate nutrition, trophic nerves. It is through the two kinds of nerves, called in general sensory and motor nerves, that man is put in appreciative connection and association with his surroundings.

NERVE TERMINALS.

The main nerve trunks divide and subdivide until they reach all the elements of the parts which they supply, and their terminal filaments are fitted for the work they have to do by development into "end organs." For instance, the nerves of touch terminate in small, rounded bodies, very sensitive to the character of surface with which the skin comes in contact; the nerves of taste are spread out on the inside of little sacks opening upon the surface of the tongue, into which the articles tested find their way. So, too, the motor nerves have their peculiar endings, those going to the voluntary muscles terminating in the minute muscular fibers by thin, flat enlargements, called end plates. The nerves which go to the glands terminate more abruptly; while those to the blood vessels, and other involuntary muscular fibers, terminate in minute interlacing fibers. The main nerve trunks with their ramifications, reaching all the elements of the parts which they supply, are known as the peripheral (outside) nerves.

SUBDIVISIONS OF THE BRAIN.

The important subdivisions of the brain, as far as they need be mentioned here, are the cerebrum, meaning great brain; the cerebellum, small or hinder brain; the pons, or bridge; and the oblongata, or oblong body.

The Cerebrum constitutes nearly seven-eighths of the whole brain, and occupies the entire upper part of the brain cavity. From the top downward, for about two-thirds of its depth, it is divided by a fissure into two parts, which are reversed duplicates of each other, called the right and left brain, or right and left hemispheres. These two halves are separated by a crescent-shaped membranous partition, called the falx, which is attached to the skull above and serves to separate the two halves, as well as to protect and to hold them in proper place. At the bottom of this fissure the two sides of the cerebrum are connected together by a band of nerve fibers which serve to connect similar parts of the right and left hemisphere, and the front and back portions of each hemisphere. Below this connecting band, which from its color is called the *corpus callosum* (white body), fibers from the two hemispheres pass into and through two small divisions, the pons and oblongata, which will be described later.

The Cerebellum, situated behind and below the cerebrum, is also divided, but less completely, into a right and left lobe, and is joined by bands of connecting fibers to the cerebrum, pons and oblongata.

The Pons and the Oblongata are situated at the base of the brain between the cerebrum above, the spinal cord below, and the cerebellum behind. The pons (bridge) is a small body, about one and a quarter inches from right to left and three-quarters of an inch from front to back, and is so called because it appears to spring across from side to side, like an arch, over the beginning of the oblongata. These two subdivisions serve the very important function of joining the cerebrum, cerebellum and spinal cord, one with another, by bundles of fibers through which motor, sensory, vaso-motor and trophic impulses are sent from the brain to the body and from the body to the brain.

This gathering and distributing function of the pons may be illustrated by the working of a telephone exchange. Subscribers from different portions of the city desire to be put in communication with other subscribers; the central office is notified

and suitable connection made at the switchboard, to which all the wires converge. The pons, which as part of its function connects the different parts, has been called the switchboard of the brain.

The passage of all these connecting fibers through the small pons and oblongata renders them very important parts of the brain structure, and it follows that diseases or injuries (lesions) in these organs, by interfering with the transmission of the various impulses, cause symptoms of wide extent and very serious nature. Moreover, these parts of the brain are not simply organs of transmission. They contain centers of very great importance, which preside over deglutition, respiration, heart action, and other important vital functions, as we shall notice more fully further on.

DECUSSATION OF NERVES.

A remarkable peculiarity in the general arrangement of nerve fibers, between the brain and the body, is that the left side of the brain is connected to the right side of the body and the right side of the brain is connected with the left side of the body. This is brought about by a decussation (crossing over) of the lines of communication from each side of the brain to the other side of the spinal cord. About ten per cent of the nerve fibers form an exception to this rule and pass to the same side of the brain and cord.

It follows from this general arrangement that injury or disease of the left side of the brain produces paralysis, or other nervous disturbance, on the right side of the body, and injury or disease in the right side of the brain produces paralysis, etc., in the left side of the body.

The facts and clinical observations upon which this principle is founded need not be introduced here. Suffice it to say the demonstration is complete and in cases of cerebral hemorrhage or brain tumor producing paralysis of one side, the surgeon unhesitatingly operates on the side of the brain opposite the paralysis. The motor fibers and the sensory fibers cross over in different ways and at different places.

MOTOR NERVES.

The motor fibers, which carry impulses from the cerebrum to all parts of the body, cross over, that is about ninety per cent of

them do, from left to right and from right to left, in passing through the pons and the oblongata. The crossing of nerves going to different parts occurs at different places or at different levels, as it is termed. The peculiar routes which the different nerve tracts take in passing through and crossing over in these organs are important and have a special interest to the neurologist, as they enable him to determine the particular location of diseases of this region. For instance, the motor fibers from each side of the brain which move the muscles of the face, the arm, and the leg, in passing through these tracts, cross over in the order named: The fibers for the face first, for the arm lower down, and for the leg lowest. Hence a lesion in the upper part of the pons affects all these fibers and causes paralysis of the whole opposite side; a lesion in the middle or lower third of the pons causes paralysis of the face on the side of the lesion, and of the arm and leg on the opposite side.

SENSORY NERVES.

As to the sensory fibers, which carry impressions from without inward—from the general body to the brain—they cross over from left to right and from right to left, not in any one small part of the cerebro-spinal axis, but along the whole length of the spinal cord, hence a lesion extending completely across the cord gives rise to loss of sensation and of voluntary motion to all parts of the body which are supplied with nerves from that portion of the cord below the disease, or injury. If the lesion is limited to one lateral half of the cord the sensations of touch, pain, temperature and tickling are lost on the side of the body opposite the disease, while the muscular sense and voluntary motion are lost on the same side as the disease.

SURFACE OF THE BRAIN.

The surface of the brain is divided by fissures into several lobes and is made up of many foldings, called convolutions, which if they could be spread out would cover an area twice or thrice as large as the apparent surface. This whole outer surface of the brain, following all its convolutions, is called the cortex or, on account of its color, the gray matter. The essential element of the gray matter is a mass of microscopic bodies called nerve cells. These cells, making up the cortex, are the active elements in

receiving and recording impressions, in directing voluntary movements, and in general mental activity. These nerve cells are peculiar in having two, three or more prolongations, several times longer than the diameter of the cells themselves. It is through the interlacing of these processes, as they are technically called, that sensorial and mental operations are supposed to be carried on. Indeed, the essential element of all nerve structure is the nerve cell in its modifications. In the gray matter the cells retain the form of a central body with prolongations, or processes, hence the gray matter is sometimes called cellular.

In the white matter the cells take on such an elongated, minute, cord-like structure, that it is called nerve fiber. Thus we speak of the gray or cellular structure, and of the white or fibrilla structure, but the nerve cell is the essential element in both.

Under this cellular layer of gray matter, which is about one-eighth of an inch in thickness, is found the white brain matter, made up principally of nerve fibers, which connect the various parts of the brain together, and also connect the brain with the spinal cord and, through the cranial nerves and spinal nerves, with all the organs of the body. These white fibers are the medium for conducting nerve impulses to and fro. In passing through the oblongata and in the cord they are gathered into certain bundles or columns—the motor columns and the sensory columns. At the base of the brain there are also several masses of gray matter, and an L-shaped mass of gray matter runs through each side of the spinal cord, the joining together of the two by their short sides giving an H-shape to the whole mass; and gray matter is found in small masses, called ganglia in connection with nerves of sensation. The office of the white matter or nerve fibers is to convey impulses; that of the gray matter to receive the impulses and interpret or act upon them.

NERVE TRUNKS.

The central nervous system is connected to the various organs and parts of the body by cords of nerve fibers, technically called nerves. Part of these principal nerve trunks are in direct connection with the brain and are called cranial nerves; and part are in direct connection with the spinal cord and are known as spinal nerves.

CRANIAL NERVES.

There are twelve pairs of cranial nerves which have their origin, or brain beginning, in different portions of the inner complicated structure of the cerebrum, the pons, the oblongata and the upper portion of the spinal cord. Some of these nerves are exclusively sensory, that is, they convey sensations inward; some are exclusively motor—that is, they convey orders for muscular movements outward; and some are mixed—that is, a part of the fibers convey messages inward, and a part convey messages outward. No fiber ever conveys messages in both directions.

The pairs of cranial nerves, beginning in front and counting backward in the order in which they appear on the under surface of the brain, upon either side of and near to the middle line, are numbered from one to twelve inclusive, and are also named according to their function or according to their distribution—that is, according to the parts to which they go. As the special functions of these nerves are of prime importance in considering their diseases, the following table is introduced, giving their number, name, distribution and function.

TABLE OF CRANIAL NERVES.

NUMBER AND NAME.	GENERAL DISTRIBUTION.	FUNCTION.
I. Olfactory	General membrane of the nose.	Sense of smell.
II. Optic.	Retina of the eye.	Sense of light.
III. Motor Oculi Communis. (General eye mover).	Muscles of the eye, except two that turn it downward and outward.	Motor.
IV. Patheticus.	One muscle which rotates the eye downward and outward.	Motor.
V. Trifacial (having sensory and motor divisions).	Sensory: Face, forehead, eye, nose, ear, mouth, tongue and teeth. Motor: Muscles of mastication.	Mixed; mainly sensory.
VI. Abducens (to pull outward).	To outer muscle of the eye.	Motor.
VII. Facial.	Muscles of the ear, face, palate, etc.	Motor.
VIII. Auditory.	Inner apparatus of the ear.	Sense of hearing.
IX. Glosso-pharyngeal.	Tongue, pharynx (throat), ear, etc.	Mixed; mainly sensory.
X. Pneumogastric.	Lung, heart, diaphragm, stomach and adjoining parts.	Mixed; mainly sensory.
XI. Spinal accessory.	Muscles of the neck, pharynx and larynx.	Mixed; mainly motor.
XII. Hypoglossal.	Muscles of the tongue, etc.	Motor.

SPINAL NERVES.

The spinal nerves are those which emanate wholly from the spinal cord.

They are practically uniform and regular in their structure and arrangement, and occur in pairs, coming out from the cord on either side through passages between the bones which form the spinal column. Each nerve is made up of two parts; roots, as they are called. The root which is furthest back, called the posterior root, comes from the sensory columns of the cord and has sensory functions only. The one at the front, called the anterior root, comes from the motor columns, and has motor functions only. They unite before passing out through the intervertebral opening, and the spinal nerves are therefore mixed, having both sensory and motor functions.

The spinal nerves, not counting rudimentary ones, number thirty-one pairs. They are classified and numbered according to the divisions of the bony spinal column (vertebra) as follows:

Cervical nerves, eight (neck).

Dorsal nerves, twelve (upper back).

Lumbar nerves, five (small of back).

Sacral nerves, five (between the hip bones).

Coccygeal nerves, one (extreme end of the spine).

The spinal nerves are distributed to the muscles and integument (skin) upon a definite plan, all the details of which it is important for the physician to understand, because it is by knowing just what nerve goes to each part, that disease affecting the cord is located. For all present purposes a very general and brief consideration of their distribution will suffice. Some of these nerves send out their branches with but little intercommunication, but others, by a kind of interlacing and crossing, form a network of nerve trunks, called a plexus, and from this plexus branches are distributed to different parts. The four upper cervical nerves form the cervical plexus, from which branches are distributed to the muscles and the skin of the back of the head, neck, shoulders, etc. Branches from this plexus also unite to form the phrenic nerve, which is the principal motor nerve of the diaphragm. The great clinical importance of this nerve rests upon the fact that the diaphragm, which is the principal muscle of respiration, is immediately paralyzed by injury to the phrenic nerve, causing immediate and very dangerous interference with the breathing.

The fifth, sixth, seventh and eighth cervical nerves and the first dorsal nerve, by an interlacing, form the brachial (arm)

plexus, situated under the arm, from which branches go to the neck, shoulders, chest and the arm, forearm and hand. These two are connected and are sometimes called the cervico-brachial plexus. The remainder of the dorsal nerves, except the twelfth, send out branches to the muscles and skin of the trunk without uniting to such an extent as to form a plexus, but it should be stated that, in common with all the spinal nerves, each one connects to some extent with the nerves above and below. The lumbar, sacral and coccygeal nerves unite to form the great lumbosacral plexus, which distributes branches to the lower portion of the body and to the legs.

CENTERS OF NERVOUS ACTION.

To a person unfamiliar with the details of operation, a large modern union railway station is a most bewildering and confusing place. Trains constantly come and go, cross from one track to another and take different sidings, with no apparent system or control. The novice, observing the seeming confusion, is surprised at the freedom from accidents and wrecks. Upon investigation he finds, at some convenient central point, the switch tower, from which all these movements are directed, and learns that it is equipped with groups of keys or levers, each of which is in connection, by electricity or compressed air, with a switch or signal, so that when its key is operated the switch is thrown or signal shown as required. This tower, with its lines of communication radiating in every direction, is the central agency through which the whole complex system is made obedient, and each of its keys may be called the center of control for that part of the system to which it is connected. Furthermore, it is easily understood that the mechanism may be so arranged that certain movements or combinations cannot be made unless preceded by certain other movements; and that injury to the central mechanism, or to the connecting device controlling any portion, prevents communication to that part and renders it inoperative. This crude illustration may serve to aid in understanding the centers of the brain and spinal cord.

The word center is very frequently used in connection with healthful action of the brain, cord and nerves, and in diseased conditions as well. As commonly used, a center is a collection of gray and white matter, of nerve cells and nerve fibers, of varying

size and complexity, having control of some physiological action. If one of these centers is destroyed the phenomena which it controls ceases; if the center is irritated by mechanical, chemical or electrical action, the phenomena appear. These centers exist all along the cerebro-spinal axis and appertain to all the functions of the whole nervous system. They are termed lower or higher, accordingly as the phenomena which they control are comparatively simple or complex.

As to location, they are designated as brain centers and spinal centers; as to methods of action, they are volitional when they can be set in motion by the will; automatic when they act independently of the will; and reflex when they act in a peculiar automatic manner. They are also called sensory, motor, vaso-motor and trophic, according to their special action, and certain ones, whose integrity is essential to life, are called vital.

BRAIN CENTERS.

The brain centers of which we have the most practical knowledge are situated on its surface and are therefore called cortical centers. It is but a few years since it was determined that certain parts of the brain cortex have direct control over the movements of definite groups of muscles. By carefully observing and recording the symptoms in cases of impaired power of the use of certain groups of muscles, and by studying the evidences of brain disease found after death, it was ascertained that a definite relation exists between the two. This discovery has been strengthened and extended by experiments performed upon the lower animals, and by the results of surgical operations upon the human brain. The outcome of all these studies confirms the theory that definite circumscribed areas of the brain cortex, the cortical centers, have special functions.

In general the frontal portion of the cerebrum, comprising a little less than one-quarter, has control of the higher mental operations; the next section, considerably more than one-quarter, has control of the voluntary muscles and is called the motor area; the third section, less than one-quarter, is the general sensory zone; and the hindermost part contains the centers for vision, etc.

The motor area, second section, is the one most clearly understood, and regarding which our knowledge is the most practically useful. In this area the centers for movements of the arm,

leg, hand, foot, thumb, great toe and many other parts have been definitely located and mapped.

Corresponding with the right and left divisions of the brain and body, these cortical centers are found on both sides of the brain, actuating, of course, the muscles of the opposite side. For parts that act separately, as, for instance, the legs, the right and left centers act independently, and a lesion of one of them affects only the muscles on the opposite side. It is doubtful if under any circumstances the center for one leg ever controls the other. In cases where the muscles of the two sides act in concert, as in breathing and talking, the centers are intimately connected and, in case of injury to one, the other acts for both. In still other instances, where the function is of a highly elaborated and complex character, such as speech, the center on the left side is especially developed, and takes precedence in control, the center on the right side being held in abeyance. If such centers on the left side be injured, the one on the right can probably be educated to act as a substitute.

SPINAL CENTERS.

The spinal cord may be considered as made up of successive segments, one for each pair of spinal nerves. Each of these segments may be considered as a special center, giving out nerves going to certain zones or regions. A thorough knowledge of such distribution is important to the neurologist, as it enables him to determine the location of disease in the cord from the muscles and parts involved.

Along each side of the spinal column runs a chain of nerves and ganglia, connected by filaments with the spinal nerves, and called the sympathetic nerve, the two chains, with their ramifications, constituting the sympathetic nervous system. It has chiefly to do with those functions which are carried on involuntarily, without any effort or will of the person, as the dilatation or contraction of the blood vessels in blushing, the processes of digestion and nutrition, secretion by glands, etc.

REFLEX ACTION.

Very many functions of different organs, as well as movements of the muscular system, are more or less under the control of the cerebro-spinal axis, through what is called reflex action.

Their phenomena are called reflex or, sometimes, the reflexes. These reflex phenomena occur in connection with movements or functions which ordinarily are under the control of the will, are partially under such control, or are always wholly independent of the will. The following are examples of reflex action ordinarily under the control of the will. A foreign substance touching the eyeball, or rapidly approaching it, will cause the eyelids to suddenly close without any voluntary effort. If one leg be thrown over the other and allowed to hang loosely, with no muscular contraction, and a slight blow be struck upon the tendon just below the knee-pan, the muscles of the front of the thigh will involuntarily contract and the foot be thrown forward. This is called the "patella reflex." The explanation of this phenomenon is as follows: The blow over the tendon sends a message by the sensory nerve to the spinal cord, where this message is transformed from the sensory side to the nerve on the motor side which takes it to the muscle as a message or notification to contract.

In illustration of reflex action affecting functions partially under control of the will, the functions of the bowels, the bladder and of respiration may be cited. In the young infant the action of the bowels and bladder are entirely automatic, and not at all under the control of the will. As the brain develops and its power increases the child is enabled, to some extent, to control these functions.

In health the principal functions of the gastro-intestinal canal, in the processes of digestion, are carried on wholly automatically, that is, without any appreciation or control by the individual. When, however, the nutriment has all been absorbed from the food in its passage through the bowel and a certain amount of residuum and excrementitious matter has accumulated in the lower part of the bowel, a certain automatic reflex action is set up and the individual feels the desire to evacuate the bowels.

Prompt attention to this "call of nature" facilitates the continuation of the automatic action and the bowel will be evacuated without any conscious effort. If, however, the will be exercised to restrain this action the call can be postponed. By continued repetition of this restraint, the reflex susceptibility becomes blunted and finally may be almost completely suppressed, resulting in chronic torpor of the bowels, a condition which underlies a great deal of ill-health. Conversely, if due attention is given to nature's

promptings, a regularity of habit can be acquired which will prove very useful. Quite similar in many respects, is the reflex function of the bladder. When a certain distention is reached, the sensory nerves announce the fact to the spinal cord and demand relief. This request can be voluntarily controlled and disobeyed for a time, but not as continuously, or harmfully, as with the bowel.

Another interesting example of partial control is that of respiration, the continuation of which, with but brief interruption, is essential to life, being one of the vital processes and under an automatic control from a center in the oblongata, whose vigilance, waking or sleeping, is always alert; yet the exigencies of speaking, singing, etc., require a voluntary control now and then of this function. We are able, therefore, within very narrow limits, to modify the breathing and even to suspend it for a brief period; but in a short time the reflex demand for air in the lungs becomes so urgent that the will is forced to give way and breathing is resumed. It is impossible, therefore, for one to "hold his breath" long enough to bring about a fatal issue.

Reflex action in organs and functions always wholly independent of the will is well illustrated in the heart and circulation. The action of the heart is entirely independent of will power, yet very susceptible to various reflex influences. Thus muscular exertion stimulates the heart to increased activity; and joy, fear, fright, physical injury, ingestion of poisons or stimulants, etc., produce sudden change in the frequency and force of the heart's action.

Of course, a great deal regarding the anatomy and physiology of the brain and nervous system must, here be omitted, there being space for only so much as is necessary to a general, non-professional understanding of nervous and mental diseases.

INVESTING MEMBRANE AND BLOOD VESSELS.

Two points pertaining to the nervous system require elucidation before going on with its diseases, to wit: Its investing membranes and blood vessels.

The bony cavity which contains the brain is lined with a strong, firm, adherent membrane, smooth and glistening on the side next the brain, called by the old anatomists, who imagined it produced the brain, the *dura mater* (hard mother). The outer covering of the brain itself, called the *arachnoid* (cob-web-like), is

a thin, delicate, transparent membrane, through which the convolutions can easily be seen. It comes in contact with the dura, but does not adhere to it. Under the arachnoid is another delicate covering, made up principally of very small blood vessels which furnish blood to the cortex, to the superficial gray matter and to the adjacent white matter. It is called the *pia mater* (tender mother) because of its peculiar office.

The lower part of the brain is supplied with blood by a different set of vessels penetrating from below. In general, the arrangement of the blood vessels of the brain differs from that in other parts of the body by not having any provision for anastomosis (opening into each other). In other parts the small arterial branches open into each other, or connect together. Hence, if a vessel of considerable size ever becomes obstructed by accident, disease or surgical operation, the region which it nourished will still be supplied by what is termed collateral circulation; that is, the blood will find its way to the region by the communications with other arteries. Thus the hand is supplied by two vessels, one on either side, which come together in a loop; if one becomes obstructed the other supplies the entire loop. Not so in the brain, for there the arterioles (small arteries) do not communicate. The consequence is that if one of the arterioles becomes obstructed the region which it supplied is no longer nourished and speedily disintegrates—a very important clinical fact. The investing membranes of the spinal cord are similar to those of the brain. These membranes taken together are called the meninges (coverings).

HOW NERVES ARE FORMED.

The conducting part of a nerve fiber is called the axis cylinder, and is a grayish, slender cord. Surrounding this is a fatty substance called the medullary sheath. Surrounding the medullary, and the contained axis cylinder, like a glove finger, is a delicate, transparent membrane called, after the name of its discoverer, the sheath of Schwann. In the brain and spinal cord the sheath of Schwann is not found, but it is always present with the outside nerves. When the nerves enter the terminal end organs the medullary sheath stops and only the axis cylinder goes on. The fibers are gathered into bundles, each of which is surrounded by its sheath, and finally these bundles are grouped together and covered by an investing membrane. It is this latter collection of

bundles which is usually called a nerve. Both the conducting elements of such a nerve and the investing membranes are subject to disease; the latter by inflammation, or other causes, may become so swollen, or thickened, as to produce destructive pressure upon the axis cylinder.

CHAPTER II.

REGENERATION AND REPAIR.

As a general rule the processes of regeneration and repair in the lower forms of animal life are, comparatively, more complete and extensive than in the higher animals. Thus some of the simplest of animal organizations, if divided in twain, immediately rearrange the parts of either half into two complete and perfect organizations. Somewhat higher in the scale, we find a class called the crustaceans (covered with a shell-like crust), of which the lobster, crab and shrimp are examples, having the power of reproducing lost parts, as legs or claws.

In the highest types of animal life, among which man stands pre-eminently first, these wholesale methods of repair do not exist. The very elaborate and complicated organs of the body cannot be reproduced or even repaired as a whole, but repair of injury or disease goes on in the microscopic cells which make up the widely differentiated structures. We find, too, as might naturally be expected, that in these higher organizations, with their refinements of structure and function, the diseases to which they are subject are correspondingly more varied and complicated.

Furthermore, the nervous system, being the most highly developed, is especially liable to both functional and organic derangement or disease, and the complete restoration of function or repair of lesion is not as readily accomplished here as in some of the less complicated organs. It follows clearly from the foregoing considerations, together with the fact that the nervous system holds such important and controlling powers and functions, that the study of its diseases is alike the most important and the most difficult of pathological problems.

Before taking up the diseases of the special nerves, or special departments of the nervous system, it is desirable to briefly consider, in a general way, the different forms of disease to which the nervous system is subject. These diseases may be considered under a few general heads, as follows: (1) Malformations of

development; (2) Inflammations; (3) Degenerations; (4) Tumors and adventitious products; (5) Diseases of the blood vessels; (6) Vascular disturbances, and (7) Functional disorders.

MALFORMATIONS OF DEVELOPMENT.

The normal development of the nervous system begins very soon after the first manifestation of vitality in the ovum and proceeds, step by step, until the cerebro-spinal axis and the whole nervous system is anatomically perfected, before birth. This normal development may, however, be arrested more or less completely at almost any stage, or the development may proceed along unnatural lines. Such arrested or abnormal development gives rise to malformations or monstrosities, which may be so comparatively insignificant as not to be demonstrable during life; or they may be so extensive as to prohibit independent existence. These arrests and deviations of growth and development ordinarily affect both the bodily structure and the mental capacity, so that mental deficiency usually accompanies both arrest of development and unnatural excess of growth. This statement is clearly substantiated by cases of feeble-mindedness, imbecility and idiocy, by dwarfism, gigantism, cretinism, and other similar conditions.

The normal brain, at birth, is structurally perfected, but it has not reached its full growth, and arrest of development may occur at any time before growth is complete. Practically, such arrest almost always occurs before the period of adolescence, and may consist of an imperfect development of the whole brain or of some particular portion of it, or the whole cerebro-spinal axis may be abnormally small. Hypertrophy (overgrowth) of the brain is rare, and may be total or partial. Sometimes parts of the brain may be misplaced, or its natural cavities may be dilated and filled with serous fluid, and sometimes the bony brain case may be wanting, or it may be so firm and solid as to prevent expansion and opportunity of brain growth.

INFLAMMATION.

When living tissue is irritated, the process or state which is set up, or which follows, is called inflammation. The general symptoms of inflammation, pain, heat, redness and swelling, are apparent to persons inexperienced in medicine. But some of

the most important results of inflammation are not readily apparent, or easily understood, by a superficial observer. Any portion of the nervous system, or of the structures which envelop it, may be attacked by inflammation. This disease, primarily confined to the blood vessels and similar structures, may attack the nervous tissues, either quickly or slowly. The attack may be upon the nerve elements themselves, or upon the connective tissues, which surround, cover or separate the nerve elements proper, or it may attack both. It may pass away without seriously impairing the nerve structure or its functions, or it may lead to degeneration and total loss of function. It is often of infectious or toxic origin. In common with inflammation of other structures, inflammation of nervous tissue may result in an exudation, or pouring out from the blood vessels of an unnatural material, called an exudate. This exudate may be serous, a clear yellowish fluid; fibrous, a soft, solid, adherent mass; or purulent, having the well-known appearance of pus or "matter" as seen in an abscess or boil. These conditions may or may not be accompanied by the death of the tissue affected. Such exudate may make its way into the substance of the brain, spinal cord or nerves, with, of course, very damaging results.

Inflammatory action may be limited to a small place or spot, it may be found in many spots (multiple), or it may spread over a large area, as the entire surface of the brain. It may be caused by syphilis, when new tissue may be slowly formed by excessive cell growth, called proliferation, without any exudation. Inflammation of nerve tissue may be acute, subacute, or chronic—that is, of a violent, rapid movement; a less rapid, moderate movement; or an especially slow, insidious movement.

Meningitis.—When the membranes covering the brain or spinal cord are inflamed the disease is called meningitis, which is usually included among the diseases of the nervous system, because its most important and serious symptoms appertain to the nervous system, through the close connection and relation of the membranes (meninges) and the nervous structure. There are several varieties of meningitis, depending upon the particular region and parts involved, the special causes of the inflammation, or the character of the exudate.

DEGENERATIONS.

Under certain conditions nerve cells and fibers are subject to a gradual process of decay and death, called degeneration. In other conditions, as, for instance, arrest of blood supply by occlusion of a blood vessel, the process of softening and death, or necrosis, may be rapid and is termed acute degeneration. The principal varieties of degeneration are the granular or fatty, when the nerve cells lose their proper character and become granular or fatty; pigmentary, when they become filled with abnormal coloring matter; fibroid, when a fibrous tissue takes the place of the nerve element; and calcareous, when the cells become changed into a chalky matter.

Degenerations may also be primary or secondary. In primary degeneration the bodies of the cells gradually grow smaller, and irregular in shape, and their processes dwindle or disappear. This form may be caused by arrest of development in the early or embryonic stage; or it may be caused by infections or poisons. Secondary degeneration follows hemorrhage into the brain, tumor pressing upon both the nerve structure and the vessels which nourish it, abscess, injury to the brain or spinal cord, etc., all being conditions which interfere with the proper nutrition of the nerve tissue by cutting off blood supply, by pressure, by direct injury, by disease, etc. Degeneration of the central nervous system may also result from disordered blood, or from disease of the blood vessels, which interferes with the proper supply of blood, either condition causing imperfect nutrition.

When degeneration of the nerve cells is complete or, in other words, when their nerve character is destroyed, they cannot be replaced, and such parts of the nervous system will always remain useless. But when they have been only damaged, regeneration may take place even after a long time. The capacity for such restoration is greater in the peripheral (outside) nerves than in the central portions. The nerves going to the extremities sometimes recover their functions after long periods of impairment, but brain structure less readily recuperates.

Another form of degeneration is called sclerosis, a term derived from a Greek word meaning hard. In sclerosis the connective tissue which forms the delicate coverings of the nerve fibers and bundles becomes thickened and hardened, presses upon the true nerve structure, and interferes with its nutrition, so that it becomes unable to properly perform its functions.

This interference with the function of the motor nerves causes various semi-paralytic disorders and, if the sensory nerves are affected, causes impaired and deranged sensation. A similar condition may occur in the brain, causing an incurable form of insanity.

Senility.—The natural condition of the nervous system in old age is that of slow decay. The general nerve tissue becomes shrunken, brain function becomes impaired, the power of the nerves to conduct impressions is lessened and the blood vessels nourishing nerve structure deteriorate. These are simply parts of the general deterioration of the whole system during the period of natural decline. These changes sometimes occur much earlier in life than usual, constituting premature senility. Indeed, senility is not marked by years, but by the changes in the brain. Sometimes this senile degeneration is so much exaggerated, either generally or in special localities, as to be properly classed as disease.

TUMORS AND ADVENTITIOUS PRODUCTS.

Various tumors, tuberculous, cancerous, syphilitic, etc., may develop in the brain and spinal cord. Occasionally the eggs of certain parasites find their way into the brain through the circulation, then develop into one phase of their cycle of growth, called hydatids, which appear like cysts filled with transparent fluid. Other cysts are sometimes found filled with a watery fluid, or with blood, and abscesses are not infrequent.

These foreign growths, or bodies, damage the nerve tissue by pressure, by interference with nutrition, or by destroying it, and are likely, sooner or later, to cause death. Incidentally, it may be said that some of these growths can be cured by medicine, some can be removed by surgery, while others, from their location, extent or character, are incurable and necessarily fatal.

VASCULAR DISTURBANCES.

The brain is one of the most vascular organs of the body, receiving a much larger proportional supply of blood than most other parts. The vessels of the brain are also thinner and have less resistance than the vessels in the body generally, hence the brain is especially liable to hemorrhage from giving way of the blood vessels. These hemorrhages may be very small but

numerous and repeated, causing thickening and change of structure of the meninges, or degenerations of the brain itself. When the vessels themselves have become diseased or weakened by bad habits, or old age, one of considerable size may give way, the outpouring blood rending the brain structure, or compressing it like a foreign body, or both. On the other hand, disease of the vessels may lessen or even occlude their caliber, or clots, etc., may obstruct them, leading to softening and death of parts of the brain by cutting off blood supply. Compression and concussion may also produce softening.

Too great an amount of blood in the brain (congestion or hyperemia) may be caused by excitement, fever and alcohol or other toxic agents, and may be followed by serious results. On the other hand the brain may suffer from anemia (lack of blood) because of a general anemic condition of the whole body, or from hemorrhage, or from local diseases, or from contractions in blood vessels.

FUNCTIONAL DISEASES.

This term means diseases not due to change of structure, but to mode of action. The so-called functional diseases of the brain (and of other organs as well) are growing less and less as our means of investigation become more perfect and complete, and enable us to determine changes of structure formerly unknown.

PREDISPOSING CAUSES.

Of these one of the most potent is heredity. Heredity may be either direct or potential. Imbecile parents may have imbecile children, or there may be a marked family tendency to the development, at about the same period of life, of similar forms of brain disease. Heredity is therefore active in the embryonic and fetal states (conditions before birth) and potential later, being most likely to assert itself in the developmental and critical periods of life. Hysteria, neurasthenia (nerve exhaustion), mania, melancholia, etc., are very likely to occur in families, alternating with alcoholism, epilepsy, syphilis, tuberculosis, etc. Insanity, deafmutism, pauperism, criminality, etc., not infrequently show themselves as inheritances from remote ancestors. Age, sex, race, occupation, habits, social condition, poisons and infections constitute other predisposing causes of nervous diseases.

EXCITING CAUSES.

Some of the foregoing may act as exciting causes, as do emotion, fright, mental strain, reflex irritation (irritation of the central nervous system by local diseases or conditions), injury, shock, etc. The mental causes, as a rule, produce functional derangements, but they may cause such intense congestion as to lead to organic disease, or even to fatal hemorrhage.

DEVELOPMENTAL INFLUENCES.

These are of great importance. In the embryonic and fetal periods they result in arrest or aberration, giving rise to malformations, idiocy and imbecility. During the stage of rapid brain growth, from infancy to about the seventh year, untoward tendencies may be shown by convulsions, night terrors, brief delirium, ephemeral fever, meningitis, etc. Chorea, epilepsy and family types are likely to appear during the second period of seven years; while hysteria, epilepsy, insanity, sexual perversions, etc., develop during puberty and youth.

No one can live to himself alone. The individual develops from, and is dominated by, a long line of ancestors, and, in turn, transmits dominating tendencies to posterity. He may be likened to the trunk of a tree, which receives support, development and possibilities from its wide spreading roots and passes on its characteristics and tendencies through its seeds.

In infancy and early childhood the nerve centers are unstable and irritable, hence the presence of spasms, brief but high fever, chorea, and the like, often being reflex disturbances from teething, indigestion, etc. In puberty and youth, when both the physical and mental characteristics are being determined, come the marked family tendencies. Later, under the burdens of business, family cares, various excesses, severe mental strain, etc., the functional neuroses appear, and finally, in old age, degeneration and hemorrhagic disturbances bring about senility and paralysis of different forms.

The female is more subject to hysteria, neurasthenia, headache, spineache and neuralgia. The motor paralyses are more frequent in the male, largely owing to the exposure incident to occupation. Many occupations, as those of clerks, telegraphers, typewriters, musicians and teachers, cause special forms of nervous disease. Paralyses, neuralgias and neurites may be caused by

mineral poisons, such as lead, mercury and arsenic. Eye strain may cause disabling headaches. Even idleness may lead to hypochondria.

HABITS AND SOCIAL CONDITION.

Alcohol causes special types of nervous disease, often of the most serious character. It is especially detrimental to the young before full bodily development has taken place, and the same is true of tobacco. Sexual irregularities and abuses depress both the physical and the psychical powers, producing functional neuroses, disorders which may terminate in organic diseases; but the popular idea that insanity, in either sex, is almost always due to the sexual apparatus is an error. Vicious habits of thought and action, bad educational methods, the harassments of a high and exacting society, the mental strain of the struggle for wealth and position, as well as the wear and tear of poverty, unceasing toil, unhappy domestic relations, improvidence, the monotony of the farm and the alley, all tend to prematurely break down the nervous system. Microbic agencies, imperfect excretion of poisons normally formed in the body, infectious processes, syphilitic poison, self-infection and self-intoxication by poisonous substances, generated within the system because of the transgression of nature's laws of health, are still other causes of disease of the nervous system, upon which space does not permit further comment.

CHAPTER III.

NEURALGIA.

Neuralgia means a nerve pain. It is a disorder of the sensory fibers of the nerves, distributed to different parts of the body, and called peripheral nerves. In some cases the motor fibers become involved, owing to their close association with the sensory fibers. Neuralgia is classed as a functional disease, because we are unable to determine, by any method at our command, that there is any change of structure in the painful nerve; but it is very probable that changes of structure may some time be demonstrated.

The term neuralgia is often misapplied, and it is important, therefore, to explain more fully the exact difference between ordinary pain and nerve pain or neuralgia. Ordinary pain is the nerve expression of local diseased conditions. Take, for instance, a case of injury to the hand, or of a felon on the finger. The ultimate nerve filaments of sensation are compressed by the swelling and irritated by the presence of inflammatory products. These impressions of irritation are conducted to the brain and are there translated into sensations of pain, which are referred to or appear to come from the injured hand or the diseased finger, and we say the hand or the finger is painful.

As an illustration of a neuralgia, or nerve pain, may be cited the pain which a person who has suffered an amputation may feel in the lost member. The popular idea is that when such pain is felt, it is an indication that the amputated member has been buried in a cramped position, or is being "cut up by the doctors," and that disinterment or rescue and careful re-burial in a natural position will relieve the pain. It goes without saying that to a clear-headed, non-superstitious person, this notion is absurd, but the explanation of feeling pain in an amputated member is not so clear.

The fact is that persons often do feel pain in amputated members, or rather they feel pain which is referred to such lost

parts. The philosophy of this may be compared to the annunciator of a hotel. Each room is connected to it by electric wires. When the proper pressure or contact is made in a room, the annunciator records the number thereof; but if the wires be cut anywhere between the room and the annunciator, and the cut ends be brought in contact, the annunciator bell will ring and the number of the room will be indicated. In a somewhat similar manner the different parts of the body are connected, by means of nerve fibers, with the brain. Local irritation of the end organs of these nerves is transmitted to the brain, which locates the sensation in the part affected. If, now, a limb be amputated and the nerve fibers which connected the lost limb with the brain be irritated in the stump, this irritation will be conveyed to the brain, where it will be translated into sensation, which will seem to come from and be referred to the missing member. The person, therefore, really feels exactly the same sensation as if the limb were in its proper place; in fact, he actually feels his amputated toes or fingers. It is very evident that the condition of the amputated limb has nothing whatever to do with this sensation. It depends entirely upon that part of the nerve fibers which remain in connection with the brain. The sensation referred to in the lost member is a neuralgia or nerve pain.

Returning to the general consideration of neuralgia, the pain varies from a mild ache to a severe pain, and may run through the whole possible scale of variety—boring, grinding, dragging, stabbing, burning, etc. The pain of neuralgia has peculiarities which distinguish it from pain due to organic disease, namely, it often shifts from one nerve, or set of nerves, to another, and has certain points of tenderness along the affected nerve.

Neuralgia may affect any nerve in the body, but only the most important will be considered.

NEURALGIA OF THE HEAD.

The important neuralgia of the head is that of the fifth pair of cranial nerves. This nerve is of mixed function, being both sensory and motor, and the largest of the cranial nerves. It is the great sensory nerve of the face, forehead and upper part of the scalp to back of and including the ears. It divides into three main branches, the ophthalmic, which goes to the eye, brow, scalp, etc., the superior maxillary, which goes to the cheek, nose, upper

teeth, etc., and the inferior maxillary, which goes to the lower part of the face, the under teeth, tongue, etc. It also supplies nerves of sensation to the interior of the nose, mouth and throat. Filaments from the different branches interlace freely, but each nerve is strictly confined to its own side of the face. The motor part of this nerve is in the third or inferior maxillary division, and is distributed to the muscles of mastication.

The very large number of nerve filaments in the face and adjacent parts (among the most sensitive portions of the body) cause any irritant to any part of this nerve to produce a profound impression. Pieces of glass, or other foreign substances, lodged in the face, the irritation of decayed teeth, etc., sometimes cause the most fearful neuralgic pains, and even set up paralyses, tremor and epilepsy. There is a peculiar association of action in the nerves, both between the different branches upon the same side, and also between the two opposite nerves. Thus irritation of the inferior maxillary branch, from decayed teeth, may cause inflammation of the eye on the same side, earache, inflammation of the middle ear, etc. This nerve is sometimes called the sentry, because its different branches at the orifice of the eye, nose, mouth and ear stand guard to give warning of approach. Inflammation and disorganization of one eye from injury is very likely to set up a similar process in the other. Upon the first indication of such sympathetic inflammation the only proper procedure is removal of the diseased eye.

Ordinary simple neuralgia may be manifested in any or all the branches of this nerve, ranging from mild to very severe. There is also a special form of neuralgia of this nerve, called *tic douloureux*, in which the pains come with the most intense severity, often accompanied by spasms, and driving the sufferer well nigh distracted.

The back of the head and neck is subject to neuralgia affecting the four upper spinal nerves, called cervico-occipital. The lower and front part of the chest and region of the ribs are respectively subject to neuralgias of the phrenic nerve (an important respiratory nerve) and the sensory branches of the dorsal spinal nerves. Neuralgia of the lumbar nerves may be referred to the small of the back, the lower part of the abdomen, the front and inner part of the thigh, the front of the knee joint, the inner part of the leg and of the foot.

In the upper extremities, neuralgia of the brachial plexus affects different parts of the arm and hand. The chief neuralgia of the lower extremities is known as sciatica, or pain in the great sciatic nerve, which passes into the leg a little behind the head of the femur or bone of the thigh.

This is often an excruciatingly painful neuralgia. The internal organs are not free from neuralgic pains. In mild cases only the sensory parts of the nerves are affected, but all parts of the nerves may be affected, and there may be sensory, motor and sympathetic disturbances.

Causes.—The causes of neuralgia are many, among them heredity, gout, neurasthenia, anemia, malaria, eye-strain, decayed teeth, injury, influenza, changes of temperature, poisons, syphilis, hysteria, etc. The hereditary causation of neuralgia cannot be disputed, but a clear distinction should be made between those who have had occasional attacks, from efficient causes, and those who are constantly neuralgic. Probably no one escapes an attack some time during life.

Neurasthenia and anemia act as causes by virtue of lowered vitality; malaria by a similar condition, dependent upon the malarial poison in the blood; eye-strain, injury and decayed teeth act by direct strain or irritation of branches of the nerve; influenza, poisons and syphilis, by poisonous and depressing action on the nerves; changes of temperature, by impairing nerve resistance. Many neuralgic cases are intimately connected with barometric disturbances. Some are affected on the approach of a storm, and can foretell its coming; others are most affected during the presence of the storm; and still others during the clear, bright weather following it.

There are many other diseases which may be mistaken for neuralgia, such as tumor of the brain or spine, disease of the bones of the spinal column, inflammation of the nerves, etc., and in all cases of neuralgic pain the patient should receive, in the early stages, competent medical advice.

The majority of cases make good recoveries; but much depends upon the kind of neuralgia and the cause. If the cause is one which cannot be removed, either by medical treatment or surgery, cure cannot be expected.

Neuralgia of the fifth nerve (one of the most common varieties) is generally curable, except when in the severer spasmodic form, called *tic douloureux*.

Treatment.—In a disorder of so varied causation, so likely to be serious and assuming so many forms, home treatment is inexpedient and the best medical advice attainable should be sought without delay. The first thing the physician will consider is whether the neuralgia is due to some general bodily ailment, anemia for instance, which weakens the whole system, or to some local irritation, as defective teeth. He will look for the local irritation first, remove it, if possible, and then, if the neuralgia persists, use measures to bring vitality up to the plane of health.

This is often a tedious and difficult task and will tax the resources of the ablest physician. If there be anemia sufficient to cause neuralgia it must be treated rigorously, with rest in bed, feeding and the best of nerve tonics. In gouty (rheumatic or lithemic) neuralgia, treatment must be directed to the constitutional disorders underlying these conditions.

When neuralgia can be clearly traced to malarial poisoning, the scientific use of quinine will prove curative. Five years ago, the writer cured a severe case of facial neuralgia, due to malaria, with three doses of quinine, and there has been no return.

In many cases remedies must be used to relieve the pain while the cause is being removed and the general health improved. A warm and equable temperature often relieves neuralgic pains and serves as an important aid to other remedies. A towel folded into many thicknesses, wrung out of water nearly boiling hot, then clapped upon the back of the neck and held there, will sometimes afford quick relief in cases of facial neuralgia, as well as in those affecting the back of the head. Electricity, properly applied, is often of great value, especially in the form affecting the back of the head. When the intercostal nerves are affected remedies to relieve pain, galvanization of the spinal cord, local support, liniments, rest in bed and quinine with salicylate of soda are the best means of treatment. For neuralgias of the arm, similar remedies with rest for the limb in a soft sling.

Neuralgias of the lower extremities, principally sciatica, are less satisfactory to treat because of the greater difficulty of putting the part at rest. To secure good results the patient must be kept in bed, or at least on a couch, for four to twelve weeks, and such remedies used as the case demands. In very obstinate cases of neuralgia which have resisted all medical treatment, especially in tic douloureux, or where there is pressure upon a nerve, it is

often advisable to resort to surgical procedure for relief, such as the stretching of the nerve, or the resection, or cutting out of a portion of the nerve. Such means usually give relief for a time, but the pain is apt to recur. A case in which several surgical operations had been performed on the fifth nerve, without material improvement, was completely cured, under the direction of the writer, by galvanism. Incidentally, it may be stated that in neuralgia of the maxillary branches of the fifth nerve, in which the pain is referred to sound teeth, the extraction of such teeth will not relieve the malady.

It is often the case that the physician can give such directions as to diet and mode of life as will have a strong influence in lessening the frequency and severity of attacks, even if they cannot be altogether prevented. The very best treatment for neuralgia is preventive. Careful attention to the laws of hygiene and keeping up sound health will keep this malady far away.

NEURITIS.

Neuritis is an inflammatory affection of a nerve trunk, nerve branches, or nerve filaments, causing one or more of the following symptoms: Pain, impaired sensation, motor paralysis and atrophy. There are two forms: The simple, affecting a single nerve; and the multiple, affecting different nerve trunks or filaments, often in an apparently capricious manner, and frequently symmetrical on the two sides. Simple neuritis may be caused by injury, such as contused or lacerated wounds; by pressure upon the brachial plexus, as by sleeping with the arm thrown over the back of a chair; by jar, as of railroad accident; by exposure to cold, by gout, syphilis, cancer, typhoid fever, diphtheria and other general diseases; by extension of inflammation from pneumonia, pleurisy, meningitis, articular rheumatism, etc.

Symptoms.—The symptoms of neuritis vary in different cases, according to the function of the nerve affected. There is always pain, more or less paralysis when a motor nerve is affected, impaired sensation when a sensory nerve is attacked; as, for instance, neuritis of the optic nerve impairs and may destroy vision; of the auditory nerve may cause deafness, or false hearing of loud noises; while neuritis of the general sensory nerves produces derangement of general sensation. The first symptom is generally pain more or less severe in the nerve itself, frequently intermittent.

This is likely to rapidly become very severe. Impairment of movement, as a rule, comes on quickly, followed by atrophy or shrinking of the diseased muscles. There is also impairment of sensation; the sense of touch may be blunted or entirely lost; sensation of pain may be diminished or wholly lost in the part supplied by the nerve; trophic changes, that is changes in nutrition, take place and the skin becomes glossy, parchment-like; perspiration may be increased or diminished, and electrical stimulation may show degeneration.

Neuritis may be acute (active and of rapid progress), subacute (less active and slower) or chronic (moderate and long continued). The essential condition in neuritis is the disorganization of the axis-cylinder—that part of the nerve that is necessary to the transmitting of impulses. It has a natural tendency to recover, varies much in its duration, and can be greatly modified and benefited by proper treatment.

In neuritis from injury much depends upon the character of the injury.

Treatment.—If a large nerve be cleanly cut across, the ends should be brought together by surgical operation, with expectation that function will be restored; if imprisoned in the callus thrown out by a broken bone, or in the swelling of an inflamed joint, such pressure must be removed, by surgical or natural process, and the part put at rest, before improvement can take place.

The line of treatment must be varied as required. In case of the arm it should be carried in a sling, and assistance be had in dressing and undressing. In neuritis of the trunk, riding or walking should be prohibited, and the movements of the trunk lessened by supports, or rest in bed. If the disease be in the lower extremities, rest in bed should be the first consideration, and be rigidly enforced, and the use of the legs be restricted, even through convalescence, until recovery is well assured. Pain must be controlled, proper reconstructives be used if the general health is poor, and special remedies employed which have a favorable effect upon the diseased nerve tissue. Electricity, properly applied, is of great benefit in many cases, but should only be used under competent medical advice. It goes without saying that the most careful attention should be given to the general health of the patient, to the end that nature may be enabled to put forth its best efforts, for in this, as in every disease, the real cure must come

through vital action, to which the physician can render most efficient aid, but without which he can do nothing.

MULTIPLE NEURITIS.

In this form different nerve trunks or filaments throughout the body or extremities are affected, sometimes in a capricious manner, and sometimes symmetrically; that is, corresponding nerves on opposite sides are affected simultaneously. Multiple neuritis may be caused by poisonous agents, such as alcohol, lead, arsenic, etc. These agents may produce very serious effects upon all parts of the nervous system, but in many cases their influence is most pernicious on the peripheral nerves.

Most cases of "alcoholic paralysis," "lead palsy," etc., are due to multiple neuritis. This disease may also be caused by infectious agents, or poisons developed within the body in diphtheria, typhoid fever, malaria, tuberculosis, etc. In the course of these diseases, or later, multiple neuritis may be developed. In tropical countries a peculiar form of multiple neuritis is often epidemic, due, probably, to an infectious micro-organism. Exposure to cold and dampness and overexertion are also causative of this disorder. It is more common in females than in males. Diphtheritic cases occur mostly in childhood; other cases appear at all ages after puberty.

Symptoms.—Multiple neuritis presents a wide variety of symptoms. Those connected with sensation are the first to attract attention and the last to pass away. In most cases numbness, tingling or formication (a feeling as if ants were crawling on the skin) are first noticed. Generally these sensations begin in the feet and hands and extend to the knees and elbows, or sometimes beyond. There may also be very distressing burning, stretching, boring or tearing sensations. Pain is generally present, usually moderate and not continuous, sometimes sharp, lancinating and very severe.

Tenderness of nerves and muscles is always present, sometimes so great as to prevent handling or moving the limb. Along with this painful feeling there is disturbance of normal sensation. At first there is oversensitiveness to touch; later diminished sensibility. In some cases the patient can feel that something is touching his limb, but cannot tell where. The special senses are not often affected.

The motor symptoms are as marked and important as the sensory. In the beginning there is a sense of simple weakness or fatigue which gradually increases until paralysis is complete, or sometimes the paralysis is developed rapidly in a few days. This paralysis may begin in a single muscle and gradually include others, and it may begin in one extremity and extend to all, or otherwise. As a rule it is most severe in the muscles which move the hands and wrists and the feet and ankles. Occasionally it attacks the thighs and arms, rarely the muscles of the trunk, but when these are attacked respiration is suspended and death follows.

The paralyzed muscles are relaxed, flabby and wasted, and the limbs assume abnormal positions, of which the "wrist drop" or "lead palsy" is a common example. In this form of multiple neuritis, when the patient attempts to hold out his hand, with palms downward, they drop or hang downward at the wrist and he is unable to raise them.

There are certain types of this disease which may well be mentioned. If a person accustomed to use alcoholic liquors in excess complains of muscular weakness, suddenly becomes paralyzed in arms and legs, has fever, becomes delirious, shows great tenderness of limbs, etc., the case is doubtless alcoholic multiple neuritis. If one who has been exposed to contamination by arsenic complains of numbness, tingling, clumsiness and fatigue, shows inability to properly control the muscles of the hands and feet, with tenderness along nerves and weak muscles, it is multiple neuritis from arsenic. Similar conditions, with marked weakness of the extensor muscles of the forearm, causing "wrist drop," indicate the same disease from lead poisoning.

A good proportion of cases of multiple neuritis recover. Very severe cases caused by alcohol, and the infectious forms, as found in the tropics, are not likely to recover. Cases have been known to be restored in three months, others have required two years to complete a cure.

Treatment.—Inasmuch as most cases are toxic in origin, the first indication for treatment is to remove the cause. In alcoholic cases, that poison must be abandoned, and resumption of its use after recovery is likely to cause relapse. Lead and arsenic must be eliminated from the system by suitable medicines. In diphtheria and other causative diseases, hygienic and anti-

septic measures must be employed to counteract infectious influences. General supporting treatment, a full, nutritious diet abounding in fat, reconstructive tonics and nerve stimulants, frequently changed, are advantageous. The scientific use of hot and cold douches, of the various electrical currents, and of skilled massage after tenderness has subsided, are of great benefit. At first rest must be had; later, moderate exercise, not carried to fatigue.

FACIAL PARALYSIS.

A comparatively common and very interesting example of neuritis in a peripheral nerve is that known as Facial Paralysis, or Bell's Palsy.

This is an inflammation of the seventh cranial nerve, or facial nerve, which has exclusively motor functions, and is distributed to the muscles of the middle ear, the face, the palate, etc. This paralysis is usually easy of recognition, as it attacks but one side of the face, as a rule, and the resulting change of expression is very characteristic.

Facial paralysis may be preceded by a sense of fullness or puffiness of the face, or it may come on suddenly without premonitory symptoms, and the whole side of the face be attacked within three or four hours. Sometimes a person, going to bed well, may find one side of his face completely paralyzed in the morning. The characteristic appearance of the face in this disease is caused by the paralysis of the muscles on the affected side, and the normal tonicity and voluntary contraction on the sound side.

On the affected side the eyebrow is elevated, the lids unnaturally separated, the lower lid drooping and allowing overflow of tears; the patient is unable to wink or close the lid, even in sleep, which may cause irritation and inflammation, and the lines of expression on that side are lost. The mouth is drawn to the sound side by the unopposed action of the muscles of that side. The lips on the affected side cannot be brought together, hence whistling is impossible, and, upon attempting it, the cheek bellies out uselessly. On account of the paralysis of the cheek, mastication is not naturally performed, the food accumulating between the teeth and the cheek. If the disease extends along the nerve toward its origin sufficiently far, the branches which go to the muscles of the palate are involved, and their paralysis embarrasses speaking and swallowing.

The causes of facial paralysis are many, some of which operate upon the nerve directly, others affecting it through central lesions. In its exit from the cranial cavity, the facial nerve passes through a long bony canal, wherein slight swelling of its investing membrane, or slight effusion therein, will produce serious pressure upon it, and, as it emerges from this canal a little below the opening into the ear, its exposed situation renders it particularly liable to injury from violence or exposure to cold. Hence, the most frequent cause is exposure to wind or draught from an open door or window, especially a car window. Among other causes is a general rheumatic condition; disease of the middle ear, which operates by extension of the inflammation to the closely adjacent nerve; injury, as a blow upon the ear; diphtheria, scarlet fever, etc., and lesions of the brain in connection with the origin of the nerve, or parts intimately connected therewith.

The outcome of facial paralysis varies widely, according to the cause and the special location of the lesion. Simple uncomplicated causes from exposure to cold recover, as a rule, in two or three months, but cases due to central brain lesions are very unfavorable.

Treatment.—The treatment must depend largely upon the cause. A superficial neuritis from exposure, etc., will require the treatment indicated for neuritis generally. If there be disease of the middle ear, such disease must have prompt, efficient attention. Rheumatic cases require anti-rheumatic treatment. If it depends upon brain lesion, the outlook is serious and the treatment must be mainly directed to the brain, although local treatment will still be of service and should not be neglected.

CHAPTER IV.

DISEASES OF THE SPINAL CORD AND OBLONGATA.

Certain anatomical and physiological arrangements of the spinal cord have such intimate bearing upon its diseases, and the consequences resulting therefrom, that it is important to bring them to mind. The motor and sensory fibers of the cord are arranged in separate bundles, or columns, as they are called, so that there are motor columns and sensory columns. It may be said, with sufficient accuracy for our purpose, that the motor columns occupy the anterior or front part of the cord, and the sensory columns the posterior or back part. It has already been stated in describing the spinal nerves that they consist of a motor or anterior root and a sensory or posterior root, being mixed nerves, and that the nerves from the upper part of the cord go to the upper part of the body and upper extremities, the nerves from the middle portion go to the middle of the trunk, and those from the lower part to the lower portion of the body and the lower extremities. Tracing the motor nerves from without into the cord, they spread out and pass through the front and side columns of the cord and enter the front portions (anterior horns) of H-shaped gray matter which is in the anterior of the cord. In this gray matter these fibers, called roots, make connection with the motor fibers from the brain, which have also passed into the anterior horn. The motor impulse from the brain, therefore, follows the motor fibers, which, it will be remembered, nearly all cross over in the oblongata, then pass down the anterior motor columns of the cord and successively penetrate to the anterior horn of gray matter. Here the impulse is transmitted to the roots of the motor nerves and thence to the muscular fibers.

The sensory portion of the spinal nerves, constituting the posterior roots, enter the cord at the back, pass almost entirely and directly into the posterior sensory columns and then cross over to the opposite side, by which they go on to the brain.

The spinal cord is, therefore, the main channel of communication between the brain and all parts of the body supplied by spinal nerves, both as to motor and sensory impulses. Hence, it follows that disease of the cord at any point sufficient to interrupt all its functions will produce paralysis both of motion and of sensation in all parts of the body which receive their nerves from the spinal cord below the injury. If the disease affects one lateral half of the cord there will be motor paralysis upon the side of the injury, and sensory paralysis on the side opposite the injury. If only certain parts or columns are diseased, the resulting phenomena will depend upon the function of the diseased portions.

Of the oblongata it need only be said that all the connecting fibers from the brain to the cord pass through it, the motor fibers crossing over therein, and that several important cranial nerves have their origin in it. Any considerable interference with the functions of the oblongata and upper part of the spinal cord is incompatible with life, and incapacity of the spinal cord to convey nerve impressions paralyzes those parts of the body to which the spinal nerves involved are distributed. Inasmuch as the nerves which control the so-called "vital functions" of respiration and circulation originate in or pass through the oblongata and beginning of the cord, the reason why marked disease or injury of this part of the cerebro-spinal axis is so fatal to life is apparent. Extensive disease of the cerebrum and cerebellum may exist without serious disturbance of respiration, circulation or digestion. Disease or injury of the spinal cord produces more or less complete paralysis of the parts supplied by nerves given off by the cord below the point of injury, but if such disease or injury be below that part of the cord directly connected with the vital functions, life may continue a long time.

The diseases of the oblongata and spinal cord as recognized, studied and classified in medical works are numerous and of the greatest importance. They are brought about by a great variety of causes, are often very difficult of diagnosis and their treatment may tax the resources of the best equipped specialist. It is not practical in a work intended for the general reader to consider these diseases in detail. They will therefore be but briefly mentioned, grouped when possible, and only general outlines of treatment indicated, to the end that the reader

may be led to appreciate their importance and induced to consult a neurologist whenever any of the symptoms mentioned are observed.

MYELITIS OR TRANSVERSE INFLAMMATION OF THE CORD.

When a portion of the cord is attacked by inflammation, which extends to all the columns and divisions, it is called myelitis, softening of the cord, transverse myelitis, or inflammation of the cord. When only a part of the columns are implicated, a specific name is used indicating the part affected.

Myelitis may be acute, subacute or chronic in its onset. When acute there may be high temperature and rapid pulse, but seldom convulsions except in children.

Symptoms.—The symptoms will vary widely according to the part of the spinal cord involved, but in all cases they group into four divisions, namely: Motor, sensory, rectal and vesical. At first these symptoms are of an irritative character, passing more or less rapidly and completely into the destructive. When this stage is fully set up there is complete motor and sensory paralysis extending upward to the line of the nerve distribution involved, with paralysis of the rectum and bladder. Usually there is a feeling about the abdomen or chest of a constricting band, which indicates the main focus of the disease, just above which is a zone of unnatural sensitiveness marking the irritated portion of the cord just above the focus. The most frequent cause of myelitis is exposure to cold and storms, injury by violence or muscular strain, infectious diseases, blood poisoning from disease or introduced poisons, spinal meningitis, etc.

Inflammation of the spinal cord, when acute, is usually fatal; speedily so if it involves the upper portion. Subacute and chronic cases, under favorable circumstances, sometimes make fairly good recoveries, but at best the disease is serious, disabling and likely to leave impairment behind.

Treatment.—The proper treatment can only be conducted by an able physician; but the efforts of the physician must be supplemented by the very best nursing and general care, often for a long time. In acute cases absolute rest, general measures to check inflammation, and putting the patient on an air or water bed to prevent, if possible, the formation of bed sores, which are very liable to complicate the case, are some of the

essential points in care-taking. Chronic cases also require rest, less pronounced, to be sure, to which general care, change of scene, medicinal springs, etc., always within the limit of fatigue, may be added if practicable.

INFANTILE SPINAL PARALYSIS.

This form of spinal disease occurs most frequently in young children, especially during the period of first dentition. It is the most common form of paralysis to which children are subject and is easily recognized.

It may come on with suddenness and violence, acute; it may less violently and rapidly develop, subacute; or it may slowly and gradually make its appearance without active symptoms. In the most acute cases a healthy child, either with or without a preliminary fever, loses completely or partially the use of one or more extremities. Such loss may be sudden, the child going to bed apparently well and found in the morning paralyzed, or two to four days may be required to develop complete paralysis.

Convulsions sometimes accompany the onset of the paralysis, but sensibility is never lost; it is always only motor paralysis. As a rule but one limb is affected, the leg about twice as often as the arm. Occasionally both legs are paralyzed, more especially in the adult, and in a very few cases one arm and one leg have been involved. In subacute cases the attack comes on with little or no force and progresses more slowly, the paralysis requiring from two to four weeks for complete development. Chronic cases move still more slowly.

Any of the voluntary muscles of the limbs or trunk may be affected, but the functions of the rectum and bladder are not impaired. After a few days the paralyzed muscles begin to regain their power. Such recovery may be almost complete and but few muscles remain permanently impaired, or nearly all the muscles originally affected may remain paralyzed; but complete recovery in all the muscles affected by infantile paralysis never takes place. All the muscles which remain paralyzed ultimately become atrophied and degenerated. The growth of the bones of the affected part is also retarded, with the result that the affected limb becomes shorter and smaller than its fellow, as well as deformed, because of the unopposed action of the healthy muscles.

The real underlying disease in this form of paralysis is inflammation and degeneration of the anterior horns or projections of the H-shaped gray matter of the cord, these horns being, as has already been described, the tract in which the motor fibers from the brain connect with the motor fibers from the cord to the muscles. Disintegration of this tract, therefore, prevents motor impulses being sent from the brain to the muscles, which become withered or atrophied and degenerated, because of disuse, and also because of deprivation of that nervous influence which controls, guides and stimulates nutrition.

The cause of this disease of the spinal cord is not clearly established. It is by far the most frequent form of paralysis to which children are subject, and in its acute form is peculiar to childhood, affecting the sexes equally, and generally occurring within the first three years of life; rarely after the sixth year, and has been known to attack an infant twelve days old. It is found all over the civilized world, often attacks strong, healthy children, although most observers find a majority of cases in those who are weak and delicate. In many cases other members of the same family are affected with some nervous disturbance.

Among the apparent causes of the acute form in childhood are exposure to cold and dampness, injury by fall, etc., disorders following such acute diseases as measles, scarlet fever, cerebrospinal meningitis, etc. Not infrequently parents ascribe this disease to "a fever," when in fact the fever only marks the inflammatory invasion of the cord, and is a consequence rather than a cause of the disorder. There is no doubt that the strain upon the nervous system during the period of first dentition brings about a state of irritability shown by restlessness, disturbed nutrition, sleeplessness, etc., in which the spinal cord is unusually sensitive, and in which slight active causes, as cold, may provoke the next step in the process of inflammation. The chronic form is seen in adults, usually between the eighteenth and fortieth years. In adults, males are most affected, and injury, muscular or mental strain, syphilis, dissipation and sexual excess are prominent causes.

In cases ushered in by fever or convulsions it is impossible to decide that one has to do with this disease until the paralysis has occurred. Hence, the fever, convulsions, etc., must be treated upon general principles and endeavor made to lessen

the fever and control the convulsions or other reflex disturbances. As soon as the paralysis makes its appearance the physician can determine the nature of the disease and begin a rational treatment.

Counter-irritation to the region of the spine, or to the whole surface, purgatives to lessen congestion of the cord, etc., are advantageous.

For the inflammation of the cord and the degenerations thereby set up, but little can be done, but suitable medication may be of great benefit in preventing extension of the inflammation and in restoring to their proper function those parts of the cord which are congested and unnaturally irritable on account of proximity to the inflamed portion. Dry cups to the spine at the seat of the lesion will be useful in this direction.

Electricity properly applied to the paralyzed muscles is a very effective agent in keeping up their nutrition and integrity until the cord resumes its functions. Under its long-continued use muscles which at first seemed to have hopelessly lost their power may be restored.

The deformities which result from infantile spinal paralysis are varied and often incapacitating. While these cannot be cured, a good deal can be done to mitigate them. Mechanical appliances will sometimes enable sound muscles to supply, in part, the movements of the disabled ones.

Massage, especially mechanical massage, will aid in restoring nutrition and function to disabled muscles, and tenotomy (dividing the tendon) will relieve some contractions and sometimes restore mobility to joints; all of which must be undertaken only under competent medical direction.

There are a number of diseases of the spinal cord and oblongata which, although not very common, are of serious importance to the patient and of great interest to the physician. They are too complicated and too difficult of comprehension to warrant a detailed description for the general reader, and they will therefore receive only brief mention.

ACUTE ASCENDING PARALYSIS.

This is a form of paralysis, almost wholly motor, commencing in the legs, ascending successively to the trunk, the arms, and lastly to the neck and face. Most cases terminate fatally

in from two or three days to two or three weeks, because extension of the disease to the oblongata causes death by involving the vital centers of respiration, circulation and deglutition.

This disease attacks males more frequently than females and occurs chiefly between the ages of twenty and forty years. It appears to have been caused by severe exposure to cold, or to have followed small-pox, diphtheria, typhoid fever, or some other obscure febrile disease. Not infrequently the sufferers have been subject to chronic alcoholism. It is very probable that the immediate factor in the nerve disturbance is some hitherto unrecognized toxic agent. While the outlook, especially in rapidly moving cases, is extremely bad, recoveries have sometimes taken place from conditions apparently hopeless.

SPINAL HEMORRHAGE.

Extravasations of blood sometimes occur into the spinal canal, rarely into the cord itself. Such hemorrhage may happen at any age, the most frequent cause being injury, which may have produced fracture of the backbone and laceration of vessels, or which may have been only a severe jar.

Spinal hemorrhage may also be brought on by prolonged and severe muscular exertion, as, for instance, a typical case which occurred in a man who had just won an eight-day, go-as-you-please walk. It may also occur in the course of certain hemorrhagic diseases, as purpura, small-pox, yellow fever and typhoid fever.

The prominent symptoms arise from the pressure upon the cord and consequent impairment of functions, and consist of sudden and violent pain in the back and along the nerves involved in the pressure, various abnormal sensations, muscular spasms, etc., followed by paralysis of the parts supplied by nerves below the hemorrhage. The cerebral functions are not usually implicated. Spinal hemorrhage is a very dangerous disease and may prove fatal in a few hours. In cases from injury, and some others, when a satisfactory diagnosis can be made and the patient is strong enough, a surgical operation is warranted. In slowly developing cases rest, remedies to divert the blood to other parts and wet cupping of the back are indicated. If the patient survive long enough, inflammation of the cord below the

hemorrhage will be set up and the treatment will be the same as for myelitis.

PROGRESSIVE MUSCULAR ATROPHY OR WASTING PALSY.

This is a disease characterized by a chronic progressive atrophy (wasting away) of the muscles, accompanied by motor paralysis, the atrophy and paralysis being almost always exactly proportionate. Symmetrical bilateral muscles are often attacked; sometimes muscles widely separated are attacked one after another. This disease presents several varieties or types, as the hand type, in which the atrophy generally begins in the muscles of the thumb and little finger and progresses to the muscles of the hand, producing the so-called "claw hand," in which the fingers are drawn and bent somewhat like claws. After a long time, years perhaps, the atrophy extends to the forearm and upper arm; ultimately the muscles of the shoulder become involved, and sometimes those of the tongue, of deglutition and of respiration, which may lead to inanition and disturbances in the breathing which may prove fatal.

There are two forms seen especially in the young, the one attacking almost always the muscles of the shoulder and upper arm first, and extending therefrom; the other beginning in the muscles of expression of the face; lastly, there is a form attacking the muscles of the leg and foot.

This disease is of a slow character, running from five to thirty years. The changes in the muscles depend upon a slow degeneration in the anterior horn of the H-shaped gray matter of the cord—the part of the cord whence the motor nerves arise—which leads to degeneration of the motor nerves and consequent atrophy of the muscles. The two forms especially seen in the young are very largely hereditary, extending sometimes through several generations. The hand and leg types are not often hereditary, but frequently depend upon muscular strain, prolonged exposure to cold, etc., as in mechanics who use the right arm excessively and men working in refrigerators and handling ice.

Progressive muscular atrophy is seldom seen among the wealthier classes, except in the hereditary form, the other forms being practically limited to the working classes, on account of the greater use of muscles and greater exposure. Acute diseases are sometimes followed by progressive muscular atrophy.

The adult form is more common in men than in women. An unfavorable outcome may be expected in this disease. It is important, therefore, that in the beginning of any condition suggesting this malady a careful diagnosis be made. For relieving the patient's condition and delaying the progress of the disease, electricity, massage, rest, cod-liver oil, nerve stimulants and a generous diet, in short, means to keep up the nutrition and tone of the nerves should be employed.

LOCOMOTOR ATAXIA.

The most common of the chronic diseases of the spinal cord is generally called locomotor ataxia, which, freely translated, means inability to walk. This inability does not depend upon atrophy or weakness of the muscles, but upon inability to properly combine their action so as to produce a desired result, and this is what is meant by ataxia. Motor ataxia is the form affecting the movements of the extremities. In static ataxia the patient is unable to maintain a steady, upright position of the body when sitting, but continually sways from side to side; the difficulty in both cases being of the same nature, but affecting different muscles. In attempting to walk the patient makes unnatural, jerky, uncertain movements, his legs flop about, and he may be entirely unable to walk, or even to stand, although his legs cannot be flexed or extended by the strongest man. The disease is also called *tabes dorsalis*, which means "wasting of the back," and is sometimes known as "consumption of the spinal cord."

The principal causes of locomotor ataxia are syphilis, injury, alcoholism, other spinal diseases, chronic poisoning by ergot (seen only in foreign rye-eating countries) and chronic poisoning by arsenic. In addition to the ataxia, both motor and static, the patient is affected with pains of a most violent, stabbing, lancinating character, which come and go suddenly and irregularly, and which are not confined to any one particular spot. There is also a peculiar condition of the eye, due to atrophy of the optic nerve, also sudden violent pains in the stomach, larynx, or over the kidneys, liable to last some hours, and simulating diseases of the organs of those regions. The functions of the bladder are frequently deranged, sometimes early in the disease, and the patient may be aware only of bladder trouble. Changes

in nutrition occur, the bones may become brittle and break under any slight provocation; the joints become impaired and movement may be either limited or too free, as in the knees, which in attempting to stand may bend the wrong way, almost as much as they bend the right way in normal walking.

There are also other symptoms, not peculiar to this disease, as zones of lessened sensibility, retardation of pain conduction shown by pricking the patient with a pin, which he feels only after several seconds, a feeling as of a girdle encircling the body, etc. This disease is essentially chronic in nearly all cases and may extend over many years. Occasionally an acute case will run its course in a few months.

It is not practical to go much into details as to the fundamental lesion or disorder of locomotor ataxia. It need only be said that it is a degeneration of the spinal cord, and that other parts of the nervous system are more or less involved.

To the skilled neurologist the diagnosis of clearly cut cases of this disease is not difficult, but in irregular cases and those complicated with other disorders it may be very difficult, for a time at least, to determine the real condition. Locomotor ataxia is a very incurable disease; indeed, the best authorities claim that the degeneration of the cord, upon which it depends, is never cured, but there is no doubt that in many cases the progress of the disease can be arrested and the patient relieved of a great deal of suffering and in many ways made much more comfortable. To this end anti-syphilitic treatment should be used in cases in which syphilis is a factor; galvanism, warmth and suspension are useful, together with remedies which directly affect the cord and nerves. The food should be light, but nutritious and easily digested; peptonized, if need be. The patient should avoid mental work, anxiety and bodily fatigue. In severe acute cases rest in bed for a few weeks is often useful; in the more chronic forms exercise need not be entirely suspended, but should always stop short of fatigue. Exposure to cold is injurious and winter is best spent in a warm, dry climate. The patient should have the best general surroundings practicable.

TRAUMATIC AFFECTION OF THE CORD.

The spinal cord is liable to direct injuries and also to be implicated in injuries to the vertebral column—the bony case in

which it is suspended. Direct injuries to the cord may result from concussion, as from a fall, railway jar or other violence not sufficient to fracture the vertebra. Such injuries may result in hemorrhage into or around the cord; the substance of the cord may be lacerated, causing inflammation and softening, or the jar to the cord may interfere with its functions without evidence of actual gross lesion. In fracture or dislocation of the vertebral column it is scarcely possible for the cord to escape damage, which may vary from very slight to such severe injury as to produce complete paralysis below the damaged part, or if the injury be in the very upper part of the cord death may follow at once.

The symptoms of traumatic myelitis may not occur immediately after the injury, but come on gradually; still the symptoms are those of more or less acute myelitis, depending in detail upon the location of the injury.

The cord is also liable to be affected in chronic diseases of the bony canal, as Pott's disease, which is, essentially, disorganization of some of the vertebral bones, causing shortening and sharp bends in the column, which may lead to pressure upon the cord, etc.

If fracture of the vertebral column be of such a character as to indicate clearly that the spinal cord has been severed, nothing will restore its functions; if the fracture produce such compression as to endanger the integrity of the cord, surgical interference at once is required; if there be little or no compression general treatment should be given at first; surgery may be needed later.

It may not be amiss to remind the reader that the danger to life of a fracture or dislocation of the back or neck depends upon the injury done the spinal cord. Many persons have lived a long time, some of them in fairly comfortable health, with a broken back or neck; others have lived years with the whole lower part of the body paralyzed, while in other cases death is instantaneous.

There are several other diseases of the spinal cord which are very important and of great interest to the neurologist, but which are so complicated in symptoms as to render it scarcely practicable to give them extended notice in a popular work. They will, therefore, receive but brief mention.

SPINAL SCLEROSIS.

The motor portions of the spinal cord are liable to a peculiar degeneration called sclerosis, which consists essentially of a hardening of the nerve bundles and a degeneration of the axis cylinder of the nerve fibers, which impair and finally destroy its functions.

The symptoms of spinal sclerosis differ according to the particular portion of the cord affected; but in general, sclerosis is characterized by a permanent contraction of the muscles, sometimes so marked as to disfigure the limbs, and sometimes only so much as to produce a peculiar spasmodic gait in which the patient scarcely touches his heel to the ground, but walks upon his toes and the ball of the foot, as if upon stiff springs, with a characteristic jerky, jiggery motion. In some forms the functions of the bladder are involved, in others not. Generally there are neither cerebral, sensory nor rectal symptoms. Sometimes there is muscular atrophy, with contraction, which gives rise to "claw hand," etc. All the forms of sclerosis are slow moving, chronic in character and hopeless as to cure, although by proper treatment, good nursing and favorable surroundings the fatal issue may be long delayed. The duration may be said to extend from three to fifty years.

BULBAR PARALYSIS.

Sometimes the oblongata is affected with a degeneration of its motor cells, which especially affects the motor cranial nerves which spring from this region and are distributed to the tongue, lips, larynx, etc. The impairment of function of the implicated nerves leads to a difficulty in articulation, especially in pronouncing words containing letters which require delicate co-ordinate movements of the tongue and lips. Indeed, it is generally this interference with articulation which first attracts the patient's attention. The paralysis increases, the palate becomes affected and finally the voice is much enfeebled by reason of paralysis of the muscles of the larynx. Mastication, deglutition, respiration and heart action become involved with the progress of the disease. The lower part of the face loses its expression and the tongue becomes atrophied. The original causes which lead to this degeneration of the oblongata—progressive bulbar paralysis (the upper part of the cord and the oblongata are sometimes called the bulb)—are not certainly known. The disease

is essentially a progressive and fatal one, and although some times there will be remissions and the symptoms apparently be at a standstill, ultimately death ensues by interference with the vital functions of respiration and circulation, as well as of nutrition. Only palliative treatment is available, such as rest, care, skillfully prepared food and a few drugs which seem to produce a temporary benefit.

PSEUDO HYPERTROPHIC MUSCULAR PARALYSIS.

A peculiar neuro-muscular disease called pseudo (false) hypertrophic muscular paralysis is so called because of the great increase in size of the legs, occasionally the arms also, accompanied by paralysis, but without mental, sensory, rectal, vesical or atrophic symptoms. This disease generally commences in childhood, most usually occurs in males, and is hereditary. The first symptom is weakness of the legs; the child has difficulty in walking, the legs are braced apart, the gait becomes waddling, the difficulties in walking increase till the child becomes helpless, although the legs are unnaturally large. The immediate cause of this condition is increase of the connective tissue between the muscular fibers—which gives the exaggerated size—the muscular fibers disappear and are replaced by fatty matter, and there is also degeneration of the nerve elements and of the spinal cord. No case of this disease has ever been known to be cured, and treatment, thus far at least, has been of no curative avail; so our efforts are limited to care and nursing.

INTRA-CRANIAL HEMORRHAGE, EMBOLISM AND THROMBOSIS.

These three derangements of the circulation within the cranium give rise to similar cerebral symptoms and will be considered together. By intracranial hemorrhage is meant the giving way of a blood vessel and the pouring out of blood into the brain substance or into one of its cavities, or upon its surface. Embolism is the obstruction of a small blood vessel by a blood clot formed elsewhere, as on the valves of the heart in heart disease, or by some other foreign matter, in either case swept on to its resting-place by the blood current. Thrombosis is the obstruction of a blood vessel by coagulation of the blood therein.

Hemorrhage is the most common. The brain is very vascular and receives a proportionally large amount of blood. Its smaller vessels are very delicate and it is especially liable to hemorrhage, especially after middle age, when the vessels are liable to become weakened. Intracranial hemorrhage may also occur in various diseases which lead to changes in the blood; as pyemia (blood poisoning from pus), typhoid fever, etc. Heredity is an important factor on account of the tendency which exists in some families to arterial disease. It was formerly thought that a person with a short neck, broad chest and florid complexion was particularly liable to cerebral hemorrhage, but it is clear that persons of the exactly opposite type are equally liable. The use of alcoholic drinks is a strongly predisposing cause, by producing disease of the vessels.

There are two classes of symptoms which attend each of the three disorders, cerebral hemorrhage, embolism and thrombosis: The reflex and the localizing. The reflex symptoms are those due to the shock which the cerebrum as a whole sustains. The localizing symptoms vary according to the location of the disease. The reflex symptoms are loss of consciousness, or coma, mental disturbances, convulsions and alterations of temperature, and will be more or less marked according to the rapidity of the hemorrhage or the amount of brain involved. Loss of consciousness may come suddenly without warning, and be complete, in which case the attack is called apoplexy, or it may be preceded by confusion, difficulty of speech, drowsiness, nausea, etc., and come on slowly and gradually. In the comatose state the face is usually swollen and flushed, or sometimes pale and clammy, the eyes fixed, pupils dilated and sluggish, respiration slow and noisy, with the cheeks puffing out, pulse slow and full, and the limbs useless. Convulsions frequently occur and may extend to all parts or be limited to one side, which is afterwards found to be paralyzed. The localizing symptoms vary according to the precise location of the disease, but as considerable knowledge pertaining to the nerves is required to understand them they will not be enumerated.

Cerebral hemorrhage may be of such extent and involve such important structure as to lead to death, either immediately or within a few days, without return to consciousness, or the patient may recover from the shock and nearly regain his former

vigor; but as a rule there is left more or less paralysis, contraction and mental impairment. It is not always possible to distinguish between these three varieties of cerebral disease. In all cases with symptoms of cerebral hemorrhage, embolism or thrombosis the services of the physician should be sought at once.

The patient should be kept quiet in bed, and not allowed to rise up, until all the reflex symptoms have disappeared. In the violent, apoplectic form of attack, active cathartics are useful by lessening blood pressure and thereby aiding to check the escape of blood from the ruptured vessel. Indeed, in many cases, bleeding would be very advantageous for its immediate effect in arresting the hemorrhage, but so great is the prejudice against it that it has almost wholly fallen into disuse. If the hemorrhage ceases, and the patient begins to improve, remedies to aid in the absorption of the blood clot and to lessen nervous irritability will be useful. The diet should be simple and moderate, and all the bodily functions be kept in the best order possible. The best of nursing will be required to prevent bed sores and other complications.

If the patient improves and the more serious symptoms of shock abate, there is still danger of fatal result from inflammation and disorganization of the brain. If this danger be passed successfully, there may still remain more or less paralysis, inability to speak, and other mental impairment. Time will frequently relieve these conditions, and general tonic medication with electricity may be of great service. Cerebral hemorrhage, if not fatal at the first attack, is likely to recur and ultimately to carry off the patient.

CHAPTER V.

DISEASES OF THE CEREBRUM, OR LARGER BRAIN.

CEREBRAL PALSIES OF CHILDREN.

Children are subject to different forms of paralysis of cerebral origin. These palsies consist of hemiplegia (paralysis on one side), double hemiplegia (on both sides) or paraplegia (both lower limbs), with spasmodic symptoms, and some wasting of the muscles and contractions, to which is often added mental impairment, and speech defect, or mutism. These palsies may be a result of defects of fetal development, of excessive pressure upon the brain during the birth process, or of hemorrhage, embolism or thrombosis, or sudden cellular disintegration, and other degenerations not well understood, to which children are especially subject during the first three or four years of life. Hemiplegia usually occurs before the third year has passed, if at all, and the mental powers may or may not be impaired. In cases resulting from congenital causes (accidents at birth), there is frequently marked mental defect, and the face is often expressionless.

The outcome of these cases will depend largely upon the amount of damage done the brain. This damage may be so great that the mental powers will never develop and the limbs will be useless, or it may be so slight that the mind will not be injured, nor the use of the palsied limb be entirely lost, although it will be smaller and weaker than its fellow.

But little can be done directly in the way of treatment. Time and good general health will lead to much improvement in some cases, and the deformities can sometimes be lessened by surgery, but operations on the brain are not warrantable.

TUMOR OF THE BRAIN.

The brain is subject to the growth therein of various forms of tumor, among which are tubercle, sarcoma (the most common form of cancer), glioma (an abnormal nerve growth), gumma (a syphilitic growth), parasitic cysts and bony growths; other rare

forms need not be mentioned. Tumors of the brain are very much more common in men than in women. A few cases occur before the twentieth year, most cases between the twentieth and fortieth, and more after forty than before twenty. In children, tubercle is the most common, in young adults glioma, and after maturity sarcoma and gunma.

The general symptoms of brain tumor are headache, which is one of the most constant, but varies greatly in character and location; vertigo, generally slight and vague; nausea and vomiting, which may be slight or so severe as to endanger life; neuritis of the optic nerve; convulsions, general and due to disturbance of the cerebrum or cerebellum as a whole, or limited to certain muscles because of implication of certain motor tracts, and, finally, mental disturbances, which may be slight or severe and tending to drowsiness and coma. There are also likely to be variations in the pulse, respiration and pupils; later, derangement of many functions, and, at last, paralysis of the bladder and bowel, bed sores, etc.

The tendency of brain tumor is to a fatal issue, but in some cases, especially of a syphilitic character, great improvement and arrest of progress may follow proper treatment. In some selected cases brain tumors have been successfully removed by surgery and the patient cured, perhaps the highest triumph of the neurologist and the surgeon.

HYDROCEPHALUS; DROPSY OF THE BRAIN; WATER ON THE BRAIN.

The surface of the brain and spinal cord, and the natural interior foldings of the brain constituting the ventricles, are bathed and lubricated by a serous liquid called the cerebro-spinal fluid. It sometimes happens that because of some disease of the brain or its membranes, or some imperfection in development, that this fluid is secreted in excess and causes pressure, both upon the brain and against the skull. This excess of water in the brain is called hydrocephalus. It may be congenital and cause such intra-uterine enlargement of the head as to impede, or even prevent, birth; or not apparent at birth, it may develop soon after, or within the first few years of childhood. Cases developing in childhood usually depend upon meningitis of some kind. Occasionally it develops later, even in adults. Dean Swift died at seventy-eight, of hydrocephalus of three years' duration, dependent, doubtless, upon obstruction in the venous circulation.

The most notable symptom of this disease is an unnatural distention of the skull, which has a peculiar shape, being rounded in front, bulging above the eyes and rather overhanging them. The eyes themselves are pushed forward in their sockets and directed downward. Sometimes the distention of the skull is so great that the bones are separated and the "soft spots," which in the healthy child become closed by bone, always remain open and, in fact, grow larger. There is generally a good deal of mental defect, frequently paralysis of one or more limbs, convulsions and contractions. The vision may be impaired because of pressure upon and disease of the optic nerve. Frequently the child shows mental irritation, resembling a mild meningitis, such as restlessness, sharp cries, disturbed sleep, etc.

The amount of fluid is usually one or two pints, although from six to eight pints, and even more, have been reported. In congenital cases the fluid is in the ventricles (cavities) of the brain, and the brain substance is thinned and pressed against the skull.

Hydrocephalus is almost always a fatal disease, although those affected with it occasionally live to twenty or thirty years; the head sometimes becoming so large and heavy that the patient cannot support it in the erect position, but has to continually lie in bed, or have the head upheld by artificial support. In a few instances the disease has been arrested and the patient has lived many years with good mental powers, but this is very unusual. In congenital cases medicinal treatment is almost never of any benefit. In cases occurring as sequels of meningitis medical treatment may be beneficial. Surgical procedure, by drawing off the fluid by compressure of the head, has been tried, but without any encouraging success.

DISEASES OF THE CEREBRO-SPINAL SYSTEM AND ITS MEMBRANES.

CEREBRO AND SPINAL MENINGITIS.

The membranes inclosing the brain and cord are called meninges, and are subject to inflammation—meningitis—which is divided into different forms, according to the location or nature of the disease, being called tubercular when caused by tubercular deposits; suppurative when accompanied by formation of pus;

cerebro-spinal when the membranes of both brain and spine are affected. Other terms with special technical meanings need not be mentioned.

SUPPURATIVE MENINGITIS.

Suppurative meningitis is caused by extension of inflammation from ear disease, or nasal disease, by purulent pleurisy, and infection from other diseases, as well as from injury, exposure to cold, and from sunstroke. The very close connection of the ear with the brain, the intercommunication between them by veins, arteries and connective tissue, and the nearness of the brain to the mastoid cells which so often become involved in suppuration of the ear, render very liable the extension of the suppurative process to the brain. Indeed, ear disease is the most frequent of all the causes of suppurative meningitis. In a similar way disease may be communicated from the nasal passages. It may also follow suppurative pleurisy, and many other suppurative diseases, by the passage of infection through the blood vessels. Injury to the head, even though not apparently serious, may also cause this affection. Exposure to cold or heat, especially direct exposure of the unprotected head to a very hot sun, are occasional causes.

In meningitis from disease of the ear or nose, the base and sides of the brain are most affected, but in infectious cases and those from sunstroke the top is more implicated. The post-mortem appearance of the brain is, in lighter cases, that of congestion dotted with pus, but in severe cases the whole surface may be bathed in pus.

Suppurative meningitis may occur at any age, and fatal cases, from extension of chronic ear trouble, or from acute involvement of the mastoid cells, are not uncommon. Senator Conkling of New York died from extension to the brain of ear disease caused, or at least made active, by exposure in a very severe snowstorm.

Symptoms.—The general symptoms are headache, delirium, fever, coma, muscular twitchings, convulsions, paralysis. These symptoms also attend other forms of brain disease, and the history of injury or of previous disease, and the condition of other organs, must be carefully examined, especially the ear, nostrils, heart and lungs. It will not always be possible for the physician to make a satisfactory diagnosis at first. This disease is of a very serious nature, although patients sometimes recover.

Treatment.—The treatment will depend largely upon the cause. If there is disease of the ear, giving rise to an accumulation of pus, it should be liberated by an operation. Disease of the nasal bones should be removed, if possible. Suitable remedies to check inflammation, and antiseptic treatment, together with the best care and nursing, are also required.

CEREBRO-SPINAL MENINGITIS.

Cerebro-spinal meningitis, first recognized as a distinct disease in Europe in 1805, has been known as “spotted fever,” “sinking typhus,” epidemic meningitis and many other names, but since its pathology has become well settled, it is known all over the world by the scientific name given at the beginning of this paragraph. Its first recognized appearance in America was at Medfield, Mass., in 1806, when it was known as “sinking typhus.” It was epidemic within the bounds of New England for about ten years. In 1822 it occurred in Middletown, Connecticut; in 1828 in Trumbull County, Ohio; in 1842 in Kentucky, Tennessee and Alabama, and then became more widely scattered. In 1864 it appeared in Carbondale, Pennsylvania, and caused the deaths of four hundred children in a population of six thousand. Various other epidemics, too numerous to mention, have since occurred, both in Europe and this country, in fact, in nearly every civilized land, and it now seems to have become naturalized in the cities of the United States, and occasionally appears in the country.

Cerebro-spinal meningitis is what is termed a constitutional malady, that is, a disease which permeates the whole system, and the meningitis is simply one of its local manifestations—the most striking and important one. The specific poison to which it is due has not been discovered, but the weight of opinion is that it is caused by a micro-organism. As its name implies, the special manifestation from which the most serious symptoms arise is an inflammation of the coverings (meninges) of the brain and adjacent spinal cord. This inflammation varies very greatly in extent, and in the stage to which it may attain. It may extend over most of the cerebral surfaces, or may be confined to small areas. In very acute, quickly fatal cases, the disease of the membranes may not have passed beyond the stage of hyperemia (the unnatural fullness and redness immediately preceding inflammation),

because the vital powers are so overcome by the constitutional disease as to produce death, before the inflammatory process has had time to go on to other stages. It is generally found, however, that the inflammation has fully begun and free exudation, either serous, fibrinous or purulent, is found in and beneath the pia mater (membrane investing the brain), together with inflammation of the brain substance itself.

A study of the location of cases occurring in cities indicates that unhygienic conditions favor the development and spread of this disease, yet it sometimes attacks those who live with the very best city surroundings or in healthful country places. Nearly three-fourths of the cases occur in children under ten years of age. As a rule the onset is sudden, generally with headache, vomiting and a chill or convulsions, followed by fever; drowsiness occurs in slight cases, delirium and coma in severe ones. In some epidemics there is a mottled appearance of the skin, or a rash, or numerous minute extravasations of blood—phenomena which have given the malady one of its names, “spotted fever.” As the disease goes on, the eyes are likely to be drawn and the pupils act irregularly. The headache becomes very severe and the head is drawn back, or the whole body is curved backward by the contraction of the posterior muscles so only the back of the head and the heels touch the bed. Sometimes there is muscular paralysis, more or less marked, and other symptoms pointing to the involvement of various nerves.

In very violent cases death may ensue within twenty-four hours; others last one or two weeks, and sometimes three or four weeks. When recovery occurs it generally comes within four weeks. About one-half the cases are fatal, and in many which survive irreparable damage has been done the nervous system, which is more likely to cause paralysis than mental impairment.

Treatment.—The treatment is beset with difficulties. In very severe cases death comes before there is time for palliative treatment. In those of less violence there should be, first, the best of nursing. No one should be allowed to see the patient but the physician and nurse. In no other disease is quiet more important. Great harm may be done by the officious meddling, so common when kindly disposed neighbors run in to help. Even apparently uncomfortable positions and lack of cleanliness would better be permitted rather than disturb the patient. The strictly medical

treatment will depend a good deal upon existing conditions. In general, cold to the head with warmth to the extremities is indicated. Among drugs, those which contract the arterioles and lessen the circulation in the brain, those which tend to lessen exudation and later stimulate its absorption, and those which tend to keep up the functions of respiration and circulation, together with such as have a soothing, quieting and hypnotic effect, are of great value when intelligently used. Of course, so serious a disease demands the best efforts of the most skillful physician.

The most careful attention should be given to the diet, which should be light and easily digested. If convalescence be established, remedies to promote absorption and to stimulate digestion and nutrition should be employed, as usual.

TUBERCULAR MENINGITIS.

That the general reader may gain a clear understanding of tubercular meningitis, brief attention must be given to what tuberculosis really is.

Tuberculosis is an infectious disease, caused by the tubercle bacillus, and characterized by the production of tissue and inflammatory products, which appear in the form of nodules, and also as a more diffused infiltration, and which rapidly undergo a cheesy degeneration. The tubercle bacillus is a micro-organism which may find its way into the system through the air passages; through the food passages, by contact with abraded surfaces, etc. This bacillus is so common and abundant that it no doubt finds entrance into every individual. In the strong and vigorous it finds no suitable soil and makes no lodgment, but when the system is susceptible, on account of hereditary weakness, debility from acute disease, impaired nutrition, exhaustion from any cause, etc., the germ gains a hold and the infection is accomplished. The bacillus now multiplies in the different tissues, according to circumstances, causing the formation of tubercular nodules, inflammation, destruction of tissues, etc. These nodules vary in size, but, scattered through the substance of the part affected, they are often about as large as a millet seed, hence are called "miliary;" by a process of aggravation or extension, they may become much larger.

The whole system becomes more or less infected and the bacilli are carried to all parts through the blood. In certain cases

they lodge in the pia mater (the delicate membrane covering the brain) and miliary tubercles develop therein, setting up a form of inflammation called tubercular meningitis, which, as will be understood in the light of the foregoing statements, is not an independent affection, but one of the most important phases of a most formidable malady—acute miliary tuberculosis.

In attacking so vital an organ as the brain and causing serious symptoms and fatal issue with great rapidity, the local disease so far outweighs the immediate danger from the general infection as to warrant a special name and special attention.

Tubercular meningitis is, therefore, an acute inflammation of the pia mater of the brain caused by a deposit of miliary tubercular granules, and characterized by an effusion of pus and lymph. There are two forms of this disease: (1) The primary, in which attention is first called to the tubercular infection by the development of the meningitis, and (2) the secondary, in which the involvement of the brain is subsequent to well marked tuberculosis of other organs and near the close of the illness. It is only the primary form which will be considered here.

Tubercular meningitis, primary, is a disease of childhood, generally occurring between the ages of two and ten, and is one of the most important and most fatal organic diseases of the cerebro-spinal system. The symptoms which precede its full development are usually vague. There is a tendency to emaciation and paleness; the child becomes peevish and listless, and loses its interest in its usual pleasures. It is likely to sleep poorly and to complain of local headache. Digestion is impaired, with occasional regurgitant vomiting. The eyes become impatient of light, there is a little fever and the pulse becomes irregular. After a week, or several weeks, symptoms become more marked. Respiration becomes irregular, the eyes half close and move slowly from side to side, and one or both pupils dilate. As the disease progresses there are more decided evidences of the damage done the brain, such as twitching of the muscles of the face, turning in of the eyes, convulsions and paralysis of the face and extremities. The fever increases, the head is drawn back, the pulse grows more frequent and full, the respiration is disturbed and death closes the scene in from three or four days to four weeks. The base of the brain is most usually affected, especially the region where the olfactory, optic and third nerves are situated, and this

accounts for some of the earlier symptoms involving the eye—the later symptoms arise from pressure and disorganization of the brain. In examinations after death, the delicate, transparent, glistening pia mater is found to be thickened, opaque, studded with tubercles, which look like little grains of rice, and bathed in an exudation of serum, lymph or pus. The brain substance shows marked changes under the microscope.

In many cases it is not difficult for the physician to determine when a child has tubercular meningitis; in other cases it may be very difficult. But very few cases of this disease recover. Indeed, many of the best practitioners, especially skilled in this class of diseases, declare they have never seen recovery. But the bare possibility of recovery, as well as the comfort of the patient and satisfaction of friends, unite to induce the most careful and intelligent treatment and nursing. Absolute rest, guarding against any disturbance which may in any way affect the sensations, the ministrations of a competent, careful nurse, who has a good deal of tact, a darkened room, medicines and food to be given with the utmost regularity, are of great importance. The physician will prescribe such medicines as the symptoms indicate.

LEAD POISONING.

Certain peculiar nerve and brain lesions are caused by poisoning by lead, which may find its way into the system by the mouth, skin and lungs.

There are many occupations which cause exposure to the poisonous action of lead, such as working in lead factories, painting, plumbing, typesetting, etc. There are also occasional sources of lead poisoning, as the use of water conveyed in lead pipe, the glaze of earthenware vessels and fruits preserved in cans, the tin of which is adulterated with lead. When slowly taken into the body it is stored up in muscles, kidneys, brain and bones.

Symptoms.—The general symptoms of lead poisoning are the so-called lead cachexia (due to impairment of the blood and weakness of the muscles), the lead line on the gums (an irregular bluish-black line at the junction of the teeth and gums), colic, pains, paralysis, cerebral complications and other nervous phenomena.

Lead colic is a very obstinate, painful colic, dependent upon the action of the lead upon the intestinal nerves, attended by vomiting and obstinate constipation, and pains which are variable

and appear to be in the muscles near the joints. But the symptoms of lead poisoning to which special attention will be given are the muscular paralysis and cerebral complications. The typical paralysis from lead poisoning is popularly known as "wrist drop." When the wrist drop is complete the patient's hands, when extended palms downward, drop at the wrist and cannot be held straight out. This is because of paralysis of the extensor muscles, as they are called, of the wrist, that move the hand in the direction of its back. Sometimes the muscles of the arm and shoulder are affected, also those extending the foot, causing "ankle drop." The affected muscles become atrophied—sometimes with cramps and tremor. There is also likely to be some impairment of sensation. In severe cases the brain is attacked and there may be convulsions, delirium, coma, loss of sensation, and of motion of part of the body, chronic mental disturbance simulating melancholia or general paralysis; and sometimes an active inflammation of the brain, called lead encephalitis (lead inflammation), which may be followed by coma and is likely to prove fatal.

The method by which lead poisoning causes the paralysis mentioned is by setting up a neuritis and thus cutting off the muscles from the nervous stimulation necessary to muscular action. The muscles atrophy from disuse. Similar processes in the brain produce the general cerebral symptoms mentioned. The physician, ordinarily, has little or no difficulty in recognizing lead poisoning, although similar manifestations may follow poisoning by other metals, as arsenic and silver. A positive diagnosis can sometimes be made in doubtful cases by a careful chemical examination of the urine, from which lead can be recovered.

Cases of ordinary simple lead poisoning, that is, of neuritis caused by lead, are almost always curable by removing the lead from the system, building up the general health, and stimulating the impaired muscles and nerves by galvanism. The drugs more especially useful are iodide of potassium to increase the excretion of lead by the kidneys, sulphate of magnesia to counteract and carry it off by the bowels, and iron, quinine, good food, etc., to build up the system. Severe pain in the attacks of colic must be relieved by anodynes, such as opium, hyoscyamus, etc. When the system has been thoroughly saturated by lead, so long continued as to produce the severe cerebral symptoms, the outlook is less favorable.

CHAPTER VI.

THE NEUROSES.

There are certain diseases which appear to have their seat in the nervous system, which are indicated by disordered sensation, volition or mental manifestation, without any evident lesion in the nervous structure and without any material agency acting to produce them—in other words, they are functional disorders which are called neuroses.

It is true that with the great advances in our knowledge of pathology the lesions causing some classes of these diseases have been determined, and it is likely that more may be known of the subtle elements of causation, in the future, but it still seems best, especially in a popular work, to follow the old way and group these diseases under the old name.

EPILEPSY.

(Fits.)

The term epilepsy is derived from a Greek word, which means “to seize upon,” and is applied to this disease because of the convulsions which seize upon the victim. There are several forms of epilepsy, the most common of which is called grand mal, a term transferred from the French and meaning great sickness, or major epilepsy.

In a typical attack of epilepsy there is a sudden loss of consciousness, a sudden sharp outcry (this symptom is sometimes missing), a fall, convulsion, blueness of the face, partial regaining of consciousness and then deep sleep for an hour or more. In falling the patient is likely to injure himself. In the convulsive stage the tongue is frequently bitten, and with return of respiration (which was arrested in the first part of the convulsion) the retained saliva is whipped into a foam, causing “frothing at the mouth.” There are almost numberless variations from this type, the most frequent of which consists of brief loss of consciousness without falling and with little or no convulsive movement. This form is known as *petite mal*, the little sickness, or minor epilepsy.

The epileptic seizures may come on without any warning, or they may be preceded by peculiar sensations in different parts of the body. Each case is a law unto itself in relation to this preliminary warning, called *aura*, meaning a sensation as of a gentle air current, commencing in a foot, hand, pit of the stomach or other part, and seeming to move toward the brain.

Although epilepsy is classed among the neuroses—functional nervous diseases—modern research has shown many cases to be due to demonstrable disease. Probably in every case there is some modifying, morbid condition of the nervous system, although not recognizable by any means yet devised.

Practically, therefore, epilepsy is divided into two great classes; the one where it is a symptom of some recognizable organic disease, the other where no disease can be recognized, called respectively symptomatic epilepsy and idiopathic epilepsy.

Symptomatic epilepsy may be caused by tumors of the brain and cord, by meningitis of any kind, by cerebral palsies and many other forms of brain disease. It may also be due to traumatic causes (injuries), especially such as produce depression of the skull and irritation of the brain from sharp pieces of displaced bone. A case of long continued epilepsy under my care in which no cause could be discovered during life was after death found to be caused by the formation of a bony growth in the membranes of the brain, not connected with the skull, and which irritated the brain by its pressure and sharp points.

In many cases epilepsy is brought about, originally at least, by irritation at some peripheral point, and is a reflex phenomenon. As an illustration, which will show this mode of causation and explain the use of "reflex," the case of convulsions from teething may be cited. A child inherits a susceptible, unstable nervous organization; teething comes, perhaps in hot weather, when the child has become unusually susceptible from heat, sleeplessness, etc.; in the tooth-cutting process the gums become swollen and tender, the nerve filaments are involved and in turn the brain becomes irritated and discharges nervous shocks along the motor lines, causing convulsions. Such convulsions are called reflex. Continued irritation from the same or other sources may produce successive convulsions until at length the habit is set up, the nervous force continues to be discharged in shocks along the same lines, now the lines of least resistance, and full-fledged epilepsy is established.

The causes of idiopathic epilepsy are not well understood; even careful investigation after death fails to find pathological causes for the disease. Epileptic seizures in many cases occur with something akin to periodicity. Nocturnal epilepsy, as its name implies, occurs only at night and may long be unsuspected by the patient or his friends. The seizures are likely to cluster around the menstrual period, or to be grouped at irregular intervals. Even when they occur daily there will be times of increasing and diminishing numbers. The frequency of attacks when on-coming or when fully established is very variable. The first seizures may be years apart, growing nearer together with a geometrical ratio, as time goes on. When fully established there may be many attacks daily or only occasional seizures. In chronic cases the seizures may become very frequent, a great many in a day. Sometimes the patient goes into a state of continued convulsion, which may last for days, called status epilepticus, which is generally fatal.

Treatment.—The treatment of epilepsy will depend largely upon the peculiarities of the case and the cause. In cases arising from determinable brain lesion, tumor, abscess, injury, etc., within the scope of modern brain surgery, operation should be had; but it is plainly useless to attempt surgery in cases caused by congenital defect. If there be reflex irritation from the teeth, stomach, genital organs, etc., the cause of irritation should be removed, if possible, by medicines or surgery; but removal of the cause is not sufficient, for whenever epilepsy is once set up it has a tendency to become permanent.

There are various remedies which often have a favorable effect upon epilepsy in a way not well understood. The most valuable of these are the bromides of potassium, sodium, ammonium, etc. To produce beneficial results the bromides must be given in doses sufficient to show constitutional effect, and for a long time. Such long-continued use of these remedies is apt to depress the general health. Hence, it is important to combine the different salts, and to use with them other remedies to counteract their effect. Occasionally there is found a case in which the bromides are harmful, and they cannot be continued. Sometimes the long-continued use of bromides causes disagreeable eruptions, especially on the face. Judicious use of correctives will do much to prevent this complication. Many other drugs prove serviceable at times.

Indeed, improvement for a time is frequently seen to follow the use of any new medicine, or even a change of residence. The advertising quack who gets his wares before the notice of epileptics reaps a golden harvest. Far better to depend upon the family physician, who can see the case frequently and watch it carefully, and whose treatment will be scientific and trustworthy.

Strict attention should be paid to diet. Chronic epileptics are prone to be hearty eaters, which tendency is harmful. The food should be mild, unstimulating and limited to the requirements of the system. In those cases which experience a distinct aura, or warning of the approach of a fit, the inhalation of nitrite of amyl will prevent the seizure. From a mistaken sympathy, parents are inclined to neglect proper control of an epileptic child, to pet it too much and allow it to dominate the family until it develops into a wayward, cruel, family and neighborhood terror. No harshness should be shown these unfortunates, but gentle, continuous, tactful, moral control is very necessary, to the end that the higher moral sentiments be cherished and developed. Too often epilepsy develops in families affected with insanity, intemperance and the nervous and other constitutional disorders which render the parents undesirable care-takers for the defective child. The tendency to transmit epilepsy is so great that no epileptic ought to marry.

The cure of epilepsy is a very uncertain problem. Certain surgical and reflex cases promptly treated are cured; other cases may be much benefited and the seizures greatly mitigated, both in frequency and severity; still other cases cannot be materially benefited. Minor epilepsy is very rarely helped by treatment. The general effect of epilepsy is to produce mental deterioration, but there are exceptions to this rule, and some notable persons who have won distinction have been subject all their lives to occasional epileptic seizures. Epileptic insanity and the peculiar automatic mental condition due to epilepsy will be considered with the insanities.

CHOREA.

(St. Anthony's Dance. St. Vitus' Dance.)

Chorea is a functional nervous disease characterized by involuntary muscular twitchings, jerky movements or wavy undulations. These phenomena may be confined to one side, but sooner or later involve all the muscles.

They may be slight in character, so as to require careful and

patient examination to discover them, or so violent as to throw the patient out of bed, unless secured or guarded. The first attack usually occurs in childhood, and more frequently in girls than in boys. Chorea may prove curable in the first two or three months, but in most cases some odd-styled movements remain through life as a legacy from the disease in childhood. Not a few cases take on a rapid development, and may sooner or later prove fatal from exhaustion. Indeed, certain types of this disease are speedily fatal.

Chorea attacks children of active and energetic bodies and minds; dullards are not subject to it. The choreic child is using its energy too fast, exhausting itself. The first indication for treatment, therefore, is to lessen this overexpenditure of energy; and the second, to strengthen the system by good food, iron, arsenic, cod-liver oil and electricity. The little patient should be put to bed for one, two or three weeks in a sunny, well ventilated room, well warmed if it be cold weather. As the child improves it may be permitted to be up and dressed an hour in the afternoon, increasing the time according to circumstances, but it should get up late, retire early and not be allowed to fatigue itself for one, two or three months. While all the remedies mentioned are important, the combination of iron and the arsenical preparations have the most specific effect upon this disease. It is important that during this period of enforced idleness the patient should have sunshine and fresh air and sufficient diversion to prevent mental discomfort. After recovery he should be carefully watched for indications of return, and put under treatment again if any symptoms be manifested. Acute cases with rapid pulse and quickened respiration are very serious and usually fatal. Chronic chorea is very intractable and renders the victim helpless and pitiable, and ultimately leads to fatal exhaustion.

HYSTERIA.

Hysteria, included among the functional nervous diseases, is a disorder with the most remarkably varied manifestations, which depend upon a peculiar increased reflex excitability of the cerebro-spinal nervous system, with decrease of the natural controlling will power. It is very commonly supposed that the symptoms of this disorder are an alternation of laughing and crying, with a choking sensation, as if something were coming up in the throat;

but only in a very small proportion of cases are these symptoms manifested. Among the causes of hysteria heredity is very frequent. This does not mean that the disease in parent and child is always the same; but that in the parent there existed some neurotic or psychic disease. Indeed, hysteria, epilepsy, insanity, intemperance and other similar manifestations run through generation after generation in varied succession.

Various diseases, injuries, unrestrained emotion, mental and physical strain, etc., are likely to cause hysteria, both in those who are predisposed and those who are not. Imitation and mental contagion account for hysterical epidemics sometimes seen in schools for girls, or in neighborhoods. It is much more frequent in women than in men.

The general symptoms may be divided into mental, sensory, motor, visceral and convulsive. The mental manifestations may vary from apparently simple caprice or lack of self-control to the severity of epilepsy, the stupor of coma or the excitement of the most violent acute mania. In the hysterical subject the emotions are not under natural control or check, there is lack of self-restraint, the appreciation of the fitness of things is deranged, and the judgment is impaired. Hence slight and ordinarily insufficient influences cause the hysterical individual to laugh or cry, to be pleased or angry, elated or depressed, charmed or frightened. Everything runs to excess.

The sensory symptoms are equally changeable, infinite in character and variety, and referable to both sensory and motor nerves and all parts of the body. There may be unnaturally acute sensation so that the slightest nerve irritation produces profound disturbance, or sensibility may be so in abeyance that the thrusting of needles through the flesh is not noticed.

The visceral symptoms are varied and may simulate almost any form of abdominal disease. The convulsions of hysteria differ from those of epilepsy; the loss of consciousness is not complete, the patients do not fall in such a way as to injure themselves, the convulsive movements are of a different character and the circulation and respiration are less affected.

Hereditary forms of hysteria are very rarely cured, although great improvement may be brought about by removing the exciting cause and building up the general health. What may be called accidental cases in those not predisposed are curable.

To successfully treat hysteria the physician must be a broad-gauged, many-sided man. No disease calls for more intelligence, knowledge of human nature, tact and skill in medicine. Both the individual and the surroundings must be most thoroughly studied, the confidence of the patient gained and the will roused to energy by skillful suggestion, emphatic command or some other method. Hysteria is a most deceptive disease to one who has it. Every little actual ailment, and even imaginary ones, are magnified and dwelt upon till the mind is wrought into the same condition as if weighed down by actual organic disease. Well meaning but misguided relatives and friends, who do not understand the true state of affairs, by dwelling upon the case and showing their anxiety, add fuel to the flame, and the mental incubus growing by what it feeds upon obtains complete control, the patient resigns herself to an imaginary fate, or turns to suicide. Many a young person brought face to face with some civil or personal responsibility and harassed by hysterical fears of incapacity, notions of unfitness or apprehensions of results, seeks "surcease of sorrow" by a wild fling into the unknown beyond. While writing this article, I see in the daily paper an account of a young girl who, expecting to graduate from the high school she has been attending, is informed by the principal that she has failed to pass in one of her studies, and in a state of hysterical depression commits suicide with rat poison.

The hysterical field yields a rich harvest to the quack, whose sometimes genuine cures do not prove that there is no such thing as disease, or material body, and that everything is spiritual; but it does show that mental energy aroused through confidence may abate the morbid belief and allow the ordinary functions and power to resume their normal sway.

In former times, when hysteria was not recognized as a disease, but was looked upon as a misdemeanor (to use a very mild term), the attempt was often made to eradicate the evil by harsh means, even severe punishment, but such a course is altogether indefensible. Sagacious ways of impressing the patient, tactful turning of the mind into normal channels, or even a harmless shock to arouse self-control, are admissible and often very beneficial. Such aid judiciously selected and timed not infrequently proves to be the moral stimulus which enables the patient to regain mental balance and thus promotes a cure.

A sagacious and experienced medical friend was once called to one of this class of patients, who was thought by her family to be very ill and who apparently had been unable to speak for several weeks. The girl was found lying in bed with a wealth of beautiful hair sweeping the floor, seemingly unconscious of her surroundings and unable to speak. Taking in the real situation, with that acumen for which the physician was noted, he gathered the hair in his hand and said slowly: "What a burden this heavy hair must be in this hot weather; nurse bring me the shears." The patient instantly roused up and exclaimed: "You are not going to cut off my hair, are you?" These were the first words she had spoken for weeks; but she had found her tongue and quickly regained her normal self-control.

A very intelligent practitioner in a neighboring county, while making a professional visit, was incidentally asked by a lady who had been unable to walk for a year how best to bandage her offending foot. Upon examination the doctor became satisfied that no real disease was there and that her inability to use it was hysterical. He fixed the patient's attention and impressively told her that he would cure her disabled foot then and there. With a few brief authoritative commands, in a few minutes he had her put her foot to the floor, bear her weight, take a step, walk across the floor, out into the yard and back; and the cure was complete.

A young woman of exceptionally fine physique, but who had inherited an unstable, neurotic temperament, was brought to my care by her physician, who with the help of a companion carried her in and laid her upon a bed, because of her supposed inability to walk. The doctor had told me in her hearing that she was continually having convulsions and that it required one or two persons to keep her from falling off the bed. After she was placed upon the bed I directed all to withdraw to the adjoining connecting room. The physician exclaimed, "It will not do to leave her alone; she will throw herself off." "We will leave her," I replied. Then turning to the nurse in charge I said in a distinct voice: "If she throws herself off the bed, put the mattress on the floor and let her lie there." After we had gone she threw herself off the bed and was put upon the mattress on the floor, but she never repeated the performance. The next day she had full control of all her limbs, and never again fell off the bed or had any difficulty in walking.

It sometimes happens that a patient becomes fixed in some erroneous belief because of a mistaken diagnosis by the physician. A case of this kind is reported by a well-known physician of New York. A bedridden young lady, daughter of an eminent clergyman, was declared by a surgeon to be suffering from a disease of the breastbone and ribs that would require a difficult operation. Finally another physician was called who after a critical examination exclaimed: "Get out of bed, put on your clothes, go down stairs and meet your mother in the parlor." She mechanically obeyed him, was soon entirely well and no relapse followed. The doctor had recognized in her an obstinate case of hysteria, which needed the stimulus of a sudden command from a will stronger than her own. These are examples of the class of cases which are cured by the faith healer, and the cures claimed to be scarcely short of the miraculous.

SOMNAMBULISM.

There are several abnormal mental conditions of unconscious or sub-conscious cerebration, as somnambulism, trance, catalepsy, night terrors, hypnotism, etc., which may properly receive brief mention. Somnambulism, or sleep walking, is a curious phase of unconscious, nocturnal cerebration somewhat analogous to hypnotism and to the double consciousness which is sometimes seen in epilepsy. The somnambulist carries on mental processes and performs physical acts unconsciously, while in a sleeping state. These operations are generally a continuation or completion of some study, work or undertaking in which the subject has been actively engaged and deeply interested; but sometimes the processes and acts are without precedent and entirely foreign to the patient's usual habits of thinking and acting.

Students have arisen in the night and completed essays or solved difficult problems in mathematics; a boy while asleep has made an accustomed trip to a neighbor's for milk; a farmer has gone to his barn and worked for several hours at his old-fashioned threshing, all unconscious of what they were doing. In other instances the somnambulist has attempted to put out an imaginary fire, to save his wife and child from a supposed wild beast, or plunged into a pond to rescue a fictitious sister from drowning. Criminal acts have also been attempted or accomplished in this state. A pupil, while somnambulist, attempting to stab his

teacher, was disarmed and taken to another room, where he slept until morning, when he had no recollection of what had taken place. A man in this condition imagined that he saw a wild beast attack his child who was in bed, and that he seized the beast and dashed it to the floor, only to find, when awakened, that he had killed his child. A most worthy tradesman of good habits was once under my care for somnambulistic attacks in which he repeatedly attempted to strangle his wife, to whom he was devotedly attached.

In most cases of somnambulism there has been exhaustion of the mental or physical strength, or both, the general health has run down, there is special mental anxiety, or there has been some reflex irritation to which is usually added some immediate exciting cause.

Treatment.—Treatment is usually successful in breaking up the habit, but it must be judicious, founded upon a thorough understanding of all the elements of the case, and be varied as the conditions indicate. Rest or change of occupation to relieve physical or mental stress and medicines to lessen nervous irritability and to build up the general health, may one or all be required. Normal suggestion, peremptory command, or even hypnotic suggestion may serve a useful purpose by mental impression. Sometimes a case is very obstinate and measures must be taken to prevent injury to the patient or to others. The occasional slight attacks experienced by a great many once or twice in a lifetime are of no consequence, and it is only when the attacks are frequent, habitual or dangerous that they require special attention.

TRANCE.

Trance or lethargy, a rare form of nervous disorder, is a peculiar sleep-like state from which the patient cannot be roused, or can be only partially roused, and is not due to organic disease of the brain, or to any poison, and is not dependent upon any general bodily disease. Cases of paroxysmal attacks of real sleep from which the patient can be completely aroused ought not to be confounded with trance. It is closely allied to catalepsy, somnambulism and hysteria, has the same general causes as hysteria, and sometimes occurs in connection therewith. A similar condition is sometimes seen in the insane, especially in chronic delusional insanity.

Trance usually comes on suddenly, or it may follow typhoid

fever, influenza or similar diseases, and may last from a few hours to several weeks. During the attack, especially if prolonged, all the vital forces are depressed. In some cases the mental functions seem to be in complete abeyance, in others the patient may be aware of what is going on around him but be unable to speak or move or manifest any consciousness. Indeed, the special senses may be preternaturally acute. Sometimes exclamations and movements indicate a mental condition similar to dreaming and in some cases actions can be excited by suggestions made to the patient. Most cases of trance recover physical and mental health; but in cases which follow severe exhausting disease, or which accompany insanity, the outcome is less favorable.

In the treatment of this disorder there are two distinct ends: To sustain the bodily powers and to arrest the seizure. For the first, advantage should be taken of any semi-conscious periods to give food, otherwise recourse must be had to feeding with the stomach tube. The most careful attention to the condition of the bowels and bladder, to keeping the extremities warm, to preventing bedsores, etc., must be given. In severe cases nothing which can be done will rouse from the lethargy, and the slow progress of nature must be awaited; but in mild cases external stimulants may rouse the patient more or less quickly and completely and cut short the attack.

CATALEPSY.

Catalepsy is more frequent in women than in men, and during early adult life than in more mature years. In many respects it is akin to hysteria and is brought about by similar causes. Nervous exhaustion is the general predisposing factor, and emotional disturbance, sudden alarm or injury the usual exciting cause. It is frequently seen in connection with melancholia.

Catalepsy is frequently preceded by headache, giddiness, etc., but the onset of the special symptoms is usually sudden and accompanied by loss of consciousness. The muscular system, in whole or in part, becomes rigid; the limbs remain in the position in which they were at the onset, as if petrified. After a while the rigidity becomes less and the limbs can be moved and placed in any desired position which they retain for a time, gradually yielding to gravitation. The countenance is usually expressionless and the respiration and circulation are weakened. In pro-

found catalepsy sensibility to touch, pain and electricity is lost; even the eye does not respond when touched. In other cases the symptoms are not so marked, partial sensibility remains and consciousness is not entirely lost. Attacks may last a few minutes or may continue for several hours. In cases connected with melancholia I have known catalepsy to continue more or less complete for weeks or months:

Recovery may be sudden or gradual. Sometimes there is a peculiar periodicity in the attacks. Between the attacks various nervous conditions may be present, or the patient may appear perfectly well. During the acute attack but little can be done in the way of treatment except external stimulation, as by ammonia, dashing cold water into the face, and especially giving a good pinch of snuff, with a view to arousing consciousness. Emetics, especially such as can be given by subcutaneous injection, will break up paroxysmal conditions. In connection with insanity, long continued cases require very careful nursing and feeding. I have seen these cases recover after long and severe attacks in which the patient was wasted almost to a skeleton; in other cases, in spite of the best care and nursing, a fatal result could not be avoided.

NIGHT TERRORS.

Children are sometimes subject to attacks in which they suddenly start up in sleep with an agonized cry, staring eyes and twitching face, and appear to be thoroughly frightened. Neither persuasion or soothing have any effect for a considerable time. Such attacks, called night terrors, are similar to somnambulism, but affect children only and do not lead to "sleep walking." The causes are much the same as those of somnambulism, barring those which are excluded by the tender age of the subject. Heredity, bad health, indigestion, constipation and worry predispose, and overeating, worms, mental strain, etc., bring on the immediate attack.

The treatment is usually less difficult than that of somnambulism. Any physical disorder or irritation should be corrected, the diet carefully regulated, the evening meal especially should be a light one, the mind should be soothed and the nervous system quieted by bromides, belladonna, tepid baths, etc.

HYPNOTISM.

It is not intended to give an exhaustive account of hypnotism and its allied conditions, but simply to briefly state some well recognized and generally admitted facts regarding these conditions, from the standpoint of candor, conservatism and honesty. And first, it may be said that it is somewhat difficult to select facts well recognized and generally admitted, for it is true that great diversity of opinion regarding hypnotism and its congeners exists among those who claim to practice it and to explain its principles. There is a wide distinction between knowing and understanding. Furthermore, those who claim to know and to understand may be, and often are, mistaken or self-deceived, or they may be conscious hypocrites and intentional deceivers. Besides, many people say they will not believe what they cannot understand, thus confusing knowing with understanding. They are so accustomed to the ordinary natural phenomena that they are led to think them easily understood. They know that seeds under favorable conditions will germinate and bring forth their kind, but they understand nothing whatever of the vital principle which directs in turn the reproduction of plants and the formation of seeds.

The scientist may go a long series of steps beyond the layman in his studies of various phenomena; may determine the nervous stimulation and method of contraction by which muscles perform their work, demonstrate that mental action is carried on by the cortical gray matter of the brain and show that nervous impulses are transmitted by the white nerve fibers, but the subtle element of vitality which bridges the chasm between the inertness of lifeless clay and the physical and mental activities of the living body remains an unsolvable mystery. If, then, no one can thoroughly comprehend normal and usual mental activity, how much less can anyone be expected to understand the peculiar, changed and uncommon if not unnatural phenomena of hypnotism; for after eliminating fraud and self-deception, on the part of both operator and subject, there no doubt remains sufficient evidence to establish the existence of the hypnotic state.

Hypnotism appears to be allied to somnambulism, trance, catalepsy and hysteria. Its phenomena, formerly known as mesmerism, have been more or less observed, under different names, for many centuries. The supposed supernatural manifestations

by the fakirs of India, the magicians of Persia; the oracles of Greece, the seers of Rome, the priests and priestesses of Egypt, the monastic recluses of the Middle Ages, the ecstasies of the seventeenth and early part of the eighteenth century, and many other similar phenomena, not classed as supernatural, are readily explained by what we know as hypnotism.

There is a great difference in persons as to susceptibility to hypnotic influences; some yield easily, others cannot be affected. There are various ways of hypnotizing which need not be dwelt upon here, but in order to succeed the patient must be in a state of receptive expectancy. With repetition the hypnotic state is more and more easily induced until in some susceptible subjects the snapping of the finger, a single word or even a glance will cause complete hypnosis. In the full hypnotic state the will of the subject appears to be completely under the control of the operator and he obeys the most absurd commands and performs the most ridiculous antics when suggested by the hypnotist. To most individuals who have passed into the hypnotic condition, suggestions may be made of the most curious character, which will be carried out after the subject is awakened. It is a disputed point as to what extent a hypnotized person can be induced to do things, or commit crimes which are repugnant to his natural moral sentiments. It is claimed by many that the moral sensibilities of the subject may be brought entirely under the domination of the operator, who can compel him to carry out criminal commands, though they be entirely foreign to his natural inclinations. Others contend that the hypnotist can put no new thought into the mind, but can only bring to the surface something which is held therein.

The exact condition of the brain and nervous system, of the organs of special sense and of mentality in the hypnotic condition are not understood, although many of the professors (?) of hypnotism, who give public exhibitions, talk glibly of what it is. Hypnotism, in many respects, resembles somnambulism, catalepsy and trance, and we are doubtless justified in saying that in the hypnotic condition the highest mental functions are in abeyance and dissociated from the lower functions which they ordinarily control and direct, and that these lower functions are for the time under the control of the higher functions of another. In other words, in the normal, natural state a person controls

or plays upon his own nervous instrument, in the hypnotic state another controls and plays upon it.

The legitimate medical benefits to be derived from hypnotism are not as extensive as some enthusiasts have been led to believe, but in certain cases it may be made useful. There are many varieties and adjuncts of hypnotism. Many persons get certain ideas fixed in their minds by a process of auto-suggestion, that is, by taking up these erroneous ideas, as, for instance, regarding their own health, and dwelling upon them until they are firmly fixed in their mind, and can be removed only by counter suggestion when the mind is in a receptive condition. It is among this class of persons that christian scientists, mind healers and layers-on of hands work their seemingly wonderful and miraculous cures.

The conscientious physician can and does often make use of counter suggestion, normal suggestion and mental impression to induce his patient to give up an absurd controlling idea and to swing back from the realms of fancy to the domain of reality. No doctor doubts that the mind has great control over the body. A patient with a buoyant, hopeful mind may recover health when mental depression, doubt and worry might turn the scale against him. A calm, hopeful person with a broken leg may get along much more comfortably and even more rapidly than a worried, discontented, restless one, but no amount of hope, resignation or faith can immediately reunite a broken bone. These facts indicate the benefits, bounds and limitations of mind healing, christian science, etc. Cases of hysterical paralysis, of disuse of limbs from mental inability to set them going, of imaginary inability to eat, etc., may be cured by any process which makes sufficient impression to start the mental machinery in a new direction. So far, too, as any of these cures or faiths, or confidence in the physician, gives the patient hope and courage, to such extent may he be helped in overcoming acute curable disease, or buoyed up in sustaining chronic and incurable affections. The claim that there is no such thing as disease and the claim of being able to treat and cure the self-same disease are sufficiently contradictory to show absurdity; but still more absurd is the claim, which I have heard made, that a devotee of faith healing could take deadly poison and not be harmed.

Hypnotism may be successfully invoked in the cure of many

morbid habits and states, but its range of usefulness is limited and the danger that may follow is not trivial. As exhibited in public by the traveling operator, or as practiced by the amateur, hypnotism is demoralizing and dangerous. Public exhibitions should be prohibited by law; neither should private exhibitions be allowed for other than scientific purposes and by persons fully competent, from observation and experience, to guard against misadventure.

PARALYSIS AGITANS.

(Shaking Palsy.)

This is a disease which is especially prone to appear in the second half of life, the great majority of cases occurring after forty or forty-five, although it has been known in patients twenty or even twelve years of age. As its name indicates, it is characterized by muscular weakness and tremor and by muscular rigidity. It is not, properly speaking, an indication of senility, but rather of a functional derangement of the nerves. It is very often difficult to determine just when the disease began; slight occasional tremors may exist for some time before the patient is aware of his real condition. It is not a very common disease and occurs with about the same frequency in the two sexes, probably slightly oftener in men than in women. In the causation of shaking palsy heredity does not play an important part, but may be traced in a small proportion of the cases; neither does station in life, nor occupation, have material influence.

The exciting causes cannot be determined in more than one-third or one-half the cases, and when found vary much in character, the most frequent being severe emotional shock, prolonged anxiety, injury and acute disease.

It is well known that sudden alarm may cause trembling, which usually subsides when the alarm is over, but sometimes persists and may develop into this disease. A lady on a ferry-boat saw a baby spring out of its mother's arms into the river. Although the child was buoyed up by its clothing and soon rescued, the lady who had been watching it was surprised to find on returning to the cabin that her upper lip was, as she expressed it, "going like a rabbit's." This proved to be the beginning of a typical paralysis agitans that culminated in death fifty years afterwards. The connection between the emotional shock and the subsequent palsy is not as a rule so marked as in this instance.

A lady thrown from a carriage was not aware of any injury beyond a slight bruising, but in a few months began to feel a weakness in her left upper arm, when raising it to dress her hair. This weakness was soon accompanied by tremor which extended until all the muscles of the body were involved and a case of paralysis agitans developed. Dysentery, typhoid fever, exposure to cold and damp, etc., are also sometimes followed by shaking palsy.

The onset of this disease is generally very gradual; occasionally it comes suddenly. As a rule some slight tremor is discovered in the muscles of the hands, limbs or face, and this, gradually increasing, extends to the muscles of all the limbs, the head, neck, face and tongue. When the disease becomes well marked the appearance of the patient is characteristic. The head is bent forward and stiffly held, the face wears an anxious expression, the arms are slightly flexed so that the hands are brought near together in front of the body, and the fingers flexed so as to bring their ends against the ends of the thumbs; the knees are also somewhat flexed and the patient walks with a short shuffling step. Because of the tendency to stoop forward, thus bringing the center of gravity in front of the support, the patient has an inclination to go forward—sometimes so great that when started he cannot stop but passes into a shuffling run.

The tremor is now almost always present but much increased when a voluntary muscular movement is attempted. This is well seen when the patient tries to feed himself and the rhythmic swaying of the hands becomes so great and persistent as to defeat the attempt. There is also contraction and painful rigidity of the muscles; and generally a tinge of color in the face which gives the appearance of health, but which is really due to vasomotor paralysis, that is enfeeblement of the nerves which control the amount of blood in the vessels. This condition is accompanied by a feeling of fullness in the head, or dizziness, arising from the same cause. The mental faculties are not usually impaired and persons have had this disease for forty or fifty years, yet retained all their natural mental vigor; but sometimes there is slight dullness, peevishness or irritability, or even decided mental deterioration. The patient may die at an advanced age, the palsy seeming to have scarcely any effect upon the duration of

life, but in other cases the continued agitation has a decided influence in wearing out the patient. There are likely to be periods of increased trembling followed by remissions. During these violent periods the patient may become for a time entirely helpless, even comatose, which may lead the physician to fear immediate death.

While the prospect of cure of this affection is not at all promising, much may be done by proper treatment to improve the patient's condition and render him more comfortable. His energy should be conserved by very late rising and avoidance of physical and mental fatigue. The diet must be nutritious and abundant, to which some constant but moderate alcoholic stimulant should be added. Tonics of various kinds to keep up the general tone of the system, together with bromides, hyoscine, galvanism, etc., to control the tremor. The patient should understand that cure is not expected; but that improvement can well nigh be assured, and also be informed that exacerbations, or bad turns, are to be expected, and must not be looked upon as necessarily indicating hopeless loss of control.

CHAPTER VII.

NERVOUS DISEASES OF GERM ORIGIN.

There are three diseases of the nervous system which are of microbic origin, i. e., are caused by germs. They are diphtheritic paralysis, hydrophobia and tetanus.

The first two have been considered under other headings, hence will only be briefly noticed here. Diphtheritic paralysis, as its name implies, follows diphtheria and is due to poisonous matter, developed by the bacteria of the disease, circulating in the blood and attacking the nerve tissues. The paralysis may affect almost any part of the muscular structure; may attack the muscles of deglutition, of the heart, or of respiration, and, while most cases recover, may prove fatal.

Hydrophobia is another disease of the nervous system dependent upon specific microbic infection. There is very great popular misconception about hydrophobia. It is a rare disease and but a very small percentage of those bitten by dogs, that appear to be mad, are affected with it; but many who are thus bitten are frightened into a state of nervous agitation, a spurious hydrophobia which may cause death.

TETANUS.

Tetanus, frequently called lockjaw, is an infectious disease, characterized by persistent spasm of the muscles and trunk, subsequently involving the muscles of the limbs. It may occur without any preceding disease, or it may follow an injury; the former being idiopathic, the latter traumatic. It is caused by a bacillus which is found in the earth, and sometimes in manure and other putrefying substances. The germs are likely to be introduced into punctured or contused wounds, especially of the hands or feet. The popular belief that a wound by a rusty nail or rough splinter from a floor is especially liable to be followed by lockjaw is not unfounded, for such articles are very likely to harbor the tetanus bacillus. The frequency with which

tetanus follows burns and other injuries from fireworks is due to the prevalence of its germs in the dust with which the hands, especially of children, become soiled while celebrating, and is rubbed by the sufferer into the smarting wound. The germs themselves do not invade the blood and general system, but grow in the wound and there form a most virulent poison which circulates in the blood and thus sets up the nervous disturbance.

When tetanus follows an injury it usually begins within ten to fifteen days. First there is slight stiffness about the neck and jaws, with difficulty in chewing; spasm of the muscles of these parts develops and the patient becomes unable to open his mouth, hence the popular name lockjaw. The spasms go on to involve all the muscles of the body, those of the back being most affected, so that during a spasm the patient takes the form of a bow and rests only upon his head and heels. Even between spasms the muscles are more or less stiffened, and the slightest irritation brings a recurrence of spasm. During the spasm the patient suffers great pain, but may not be able to speak. He is usually bathed in profuse perspiration. In some cases there may be scarcely any rise in temperature, in others the temperature runs very high. Death may occur from heart failure, or suspension of respiration during a paroxysm, or from general exhaustion.

Tetanus is a very fatal disease. Hippocrates, who is called the father of medicine, and who wrote about 400 B. C., says: "The spasm supervening on a wound is fatal, and such persons as are seized with tetanus die within four days; or if they pass these they recover." Indeed, at the present day the mortality in traumatic cases is eighty per cent, and in idiopathic cases, fifty per cent.

Treatment.—To be of avail the treatment should be prompt and thorough, under the best obtainable medical advice. In traumatic cases thorough excision and antiseptic treatment of the wound must be carried out; the patient should be kept in a quiet, dark room, with a single nurse, and all sources of irritation excluded. The spasms must be controlled by chloroform, chloral, bromide of potassium, morphine, etc. When the lockjaw prevents ordinary feeding, food can be conveyed to the stomach by the nasal tube, or rectal injection can be used. Idiopathic cases require the same line of treatment, excepting, of course, that part which concerns the wound itself.

The greater number of cases of this dreadful disease could be avoided by promptly and thoroughly bathing all wounds liable to be infected, in a twenty per cent solution of carbolic acid, or some other effective germicide, then preventing further infection by wrapping the part in a clean cloth saturated in the same solution, the hands of the operator having first been cleansed by a careful washing in soap and water. It is not in the severity of the wound, but in its infection that the danger lies—a very slight lesion being sufficient to admit the germs.

NERVOUS SYMPTOMS.

There are certain nervous symptoms, common to different diseases, which are of sufficient importance to merit special though necessarily brief consideration.

VERTIGO.

Vertigo, or dizziness, means a sensation of loss of equilibrium, with momentary partial loss of consciousness. It may be caused by, or be a symptom of, several quite different disorders. The treatment will, of course, be the treatment of the disease of which it is a symptom. One of the most frequent causes of vertigo is that condition of the system called lithemia, a state in which the nutritive functions are deranged and the system loaded with effete matter. Lithemia is to be treated by remedies which stimulate proper nutritional change and free the blood from waste and imperfectly oxidized matter. Disease of the kidneys is an occasional cause of vertigo, which can be determined by proper examination of the urine, and treated by remedies directed to the restoration of the functions of the organs involved.

Disease of the ear may cause vertigo, in some cases of a very severe type, which requires treatment suited to the character of the ear disease.

Eye strain, itself caused by muscular imperfection or defect in the apparatus for adjustment, sometimes causes vertigo. This condition should be remedied by operation, or by proper glasses, as required.

A depraved state of the blood, or disease of the heart or blood vessels may cause vertigo by affecting the quality or quantity of blood supplied to the brain. Treatment should be directed

to restoring the quality of the blood, or regulating the action of the heart, or improving the condition of the vessels.

Both gout and the excessive use of alcoholic liquors are sometimes chargeable with vertigo. Occasionally vertigo is caused by various brain diseases. The popular idea, however, that vertigo is especially indicative of brain disorder is not correct, and it is often a relief to patients to know this. Vertigo is also a symptom of locomotor ataxia, but is not common in other spinal diseases.

So far as vertigo itself is concerned, the outcome depends a great deal upon the special condition of which it is a symptom. In lithemia it is frequently hard to overcome and may annoy the patient many years; for the lithemia itself is difficult to completely eradicate; but it is annoying only, not serious. In acute kidney disease, especially in the young, the vertigo may be cured along with the disease itself; but in chronic kidney disease the outlook is grave. The ear and eye cases are sometimes curable, sometimes not, depending upon the character of the ear and eye diseases. Impaired condition of the blood can generally be cured and the vertigo with it. With vertigo, dependent upon alcohol, if the alcoholism can be cured and no organic damage has been done, the result is generally good. When vertigo is a symptom of brain disease, or spinal disease, the prospect is generally serious.

HEADACHE.

Headache is a symptom of many forms of nervous disease, and is also very frequent in other diseases and disorders. Sometimes the disease of which headache is a symptom is easily determined, and sometimes the headache is about all that can be made out. It is answerable for a large share of human suffering, and may vary from simply a disagreeable dull feeling to the most intense pain which can only be described as agony. It may be persistent for hours or even months, or it may be evanescent, lasting but a moment. It may be a continuous uniform pain, it may come in paroxysms, it may be intermittent or it may be throbbing. It may affect the whole head, or one-half of it, or be confined to a small area, or change from point to point. Sometimes the scalp may be very tender to the touch, and combing the hair or any jarring of the head may greatly increase the pain. The eyes may be very sensitive to light, or vision may

be impaired and loud or even ordinary sounds may be very painful and exasperating.

During an attack of headache the feet and hands, and frequently the general surface of the body, are likely to be cool, unless fever is present, and the head may be either cool or hot. The pulse may be rapid or slow; the appetite lessened or increased, and eating may sometimes afford relief, but more generally increases the pain and is followed by vomiting. In some cases a person may continue both mental and physical exercise when affected with headache, in others either mental or physical activity so increases the suffering as to enforce the utmost quiet. Of the many forms of this disorder, the most important will be considered.

Headache is a symptom of many of the brain and nervous diseases which have already been described, and as such the treatment is included in that of the respective disorders. Many nervous persons are much troubled by headache from overwork, mental or physical, from stress of care and responsibility, from worry, disappointment, etc. This is called nervous headache and may be almost continuous or come in paroxysms. When paroxysmal it may be severe and accompanied by intolerance of light and sound, sometimes by marked irritability, and occasionally by vomiting. In these instances it is much like sick headache but more preventable by hygiene and calmness. Nervous headache is most common in women and children of feeble constitution who are poorly nourished. The treatment for this form is building up the health by improving digestion and nutrition and avoiding worry and nervous excitement.

Headache is not uncommon from eye-strain, which itself may be due to astigmatism, distorted shape of the eyeball, unequal action of the muscles or oversensitiveness of internal parts. For these conditions relief may be had from properly fitted glasses and rest.

A very common form of headache is that generally known as sick headache. This form is more or less periodical, or at least recurrent. Many persons, about equally divided as to sex, are subject to attacks during all their lives and the disorder is markedly hereditary. The manner in which the attacks come on differs in different persons, but in each patient it generally begins every time in the same way. The pain may affect one or both

sides of the head, may change from side to side, be general over the head or confined to the forehead, temples or base; it may come on at any time of the day and may be preceded by an unusual appetite. After several hours there may be vomiting and relief, or after emptying the stomach the pain may not subside until the patient has slept. When he awakes the pain and distress will usually be gone and only a feeling of soreness remain for a few hours. The vomited matter consists of undigested food and mucus. Some persons rarely vomit, some do with nearly every attack, while with others vomiting is repeated many times with great nausea and the bringing up of bile.

The victim of sick headache is very likely to think the attacks due to indiscretions of diet, of eating at irregular times, or hurriedly, or when the mind is intensely occupied, etc.; but while careful attention to regular habits in this direction will lessen the frequency and severity of the attacks, it will not altogether prevent them. The real difficulty lies in the peculiarly susceptible nervous organization.

Another form of headache is caused by acute indigestion. It is usually severe, of a "snapping" character, coming on suddenly after overeating or freely partaking of indigestible food and alcoholic drinks. Indeed, this is the headache which follows banquets and wine suppers. Because of the nausea and vomiting which is likely to go with this headache, it is frequently called sick-headache, but it is very different from the proper periodical sick-headache. Headache from acute indigestion is generally relieved soon after the stomach has been unloaded; the vomiting is often accompanied by diarrhea—a real cholera morbus.

With some persons whose digestion is weak and whose nervous system is easily perturbed, slight errors or excesses may bring on the headache of acute indigestion; others can eat and drink almost anything without inconvenience. Certain dyspeptics have very frequent, sometimes daily, headache, accompanied by dyspeptic symptoms, coated tongue, acid stomach and constipation. The headache may be felt at waking in the morning and disappear during the day; or it may come on in the afternoon and disappear at night. As a rule this headache does not interfere with ordinary duties, but occasionally an unusually severe attack will be disabling.

Malarial headache depends upon malarial poison, and comes

in paroxysms with the regularity of ague. It is generally confined to one side of the head, comes suddenly, is very severe for a few hours and passes away leaving a feeling of soreness.

Headache is a frequent accompaniment of anemia and great debility, and in intense cases is almost constant. When the patient is in a state of rest both of body and mind the headache may disappear, only to recur on the least bodily or mental exertion.

GENERAL TREATMENT OF HEADACHE.

In the treatment of headache the first thing is to determine what causes it, and the next to remove or correct such cause. This may be a comparatively easy matter, or a very difficult one. If the headache depends upon acute disease, fever, rheumatism, pneumonia, etc., the proper treatment of such acute disease may be all that will be required for the headache, or remedies may be needed which will directly lessen the pain.

For the headache of eye-strain, use proper glasses fitted by a competent oculist. In brain diseases, and some nervous diseases, the headache symptom depends directly upon the implication of the nervous tissue. Here, too, will often be required not only the general treatment of the brain or nerve disorder, but the painful symptoms will require the use of remedies to overcome or soothe the pain, as an opiate or other anodyne.

Malarial headache will best be treated by full doses of quinine till the periodicity is broken up, then strengthen the system with iron, arsenic, strychnia, etc.

When headache depends upon anemia, the blood must be restored to a healthy condition. This is often a difficult task, for the anemia may be caused by disorder of the stomach, by exhausting discharges, by impaired action of certain glands, by derangement of the blood-forming apparatus, etc. The discovery of the ultimate causation of anemia and its treatment is a problem to be solved only by a skillful physician.

In the treatment of nervous headache—the headaches of acute indigestion and of dyspepsia, sick-headache and the attacks of other recognized and unrecognized varieties—there is considerable scope for hygienic and preventive measures, for the lessening of discomfort by domestic remedies and for nursing, as well as for the curative treatment of the physician. Between the attacks efforts should be directed to lessening the tendency

to recurrence and extending the intervals between them by improving the general condition of the system and bringing it up to a high standard of vigor. In the established periodical headaches it is generally impossible to entirely prevent them, though much may be done to render them less frequent and less severe. Those subject to constitutional headaches are in a condition below the normal standard, and a regulation of diet, exercise and habits, with suitable medicines to keep the excretions active and to stimulate and tone up the system, will strengthen the powers of resistance and increase the intervals between the attacks and render them lighter. To this end defects in hygienic surroundings and influences should be thoroughly corrected, requiring, it may be, a complete change in location or business, often difficult or impossible to accomplish. Much may be done by the patient if he will courageously and systematically correct his diet by discarding pastry, indigestible foods, stimulants, tea and coffee. The latter is often looked upon by these patients as a necessary nerve tonic, when in fact it is the reaction following its stimulation which really causes the headache. The victim of sick-headache should, under judicious advice, abandon the articles of food and drink at all likely to produce nervous disorder, and limit his diet to the most easily digested foods, and to those especial articles which careful experiment shows to be best fitted for him, for to some extent each case is a law to itself.

It follows with even greater force that one who is subject to the headache of acute indigestion caused by wine suppers, cloying refreshments served at parties, or even wholesome food taken out of season, should carefully avoid what, to him at least, are baneful excesses; while the habitual dyspeptic should strictly regulate the quality and quantity of his food, as well as the time of taking it. Dyspepsia may be caused by monotonous or coarse foods, or by a diet not generally objectionable but not adapted to the individual. A hasty plate of oatmeal in the morning and an inadequate lunch, postponed by business, may bring the patient to his evening meal with a headache, exhaustion and nervousness which well nigh preclude eating; the dyspepsia of insufficient nutrition ere long leading to complete breakdown. Such dyspepsia may be cured by a generous beefsteak with toast slowly eaten in the morning, a nourishing lunch at a regular hour in the middle of the day, and a hearty but digestible

meal when the day's work is done. Cooks, by continual eating, often develop dyspeptic headache, and servant girls acquire dyspeptic anemia from limiting their meals to "tea and bread," conditions to be respectively cured by regularity and a generous mixed diet. Emotional and nervous excitement is very likely to precipitate an attack of headache, and those who are subject to this malady should cultivate self-control and uniformity of temper.

The medical requirements will be met by bitter tonics, bark, *nux vomica*, quinine, iron, gentian, etc., in various combinations. Most patients are constipated and the bowels should be moved once daily by gentle agents suited to the particular case. Various mineral waters, or salines in hot or cold water, before breakfast, phosphate of soda as a liver stimulant, or aloes, rhubarb, podophyllin, laptondrin, in various combinations, with strychnia or belladonna, may be used according to the nature of the case and idiosyncrasy of the patient. The preparations of *cascara sagrada* (sacral bark) are most excellent in relieving chronic constipation. While violent purgation by large doses of "salts," pills, etc., is decidedly injurious, suitable combinations to persuade the bowels to a daily movement may be taken indefinitely without harm.

When symptoms of an approaching attack are felt, there is a wide difference as to what can be done to ward off or mitigate it. If the attack depends upon acute indigestion or simply follows a hearty meal, prompt evacuation of the stomach by warm water and mustard, or by ipecac, or by a hypodermic injection of apomorphia, followed if need be by movement of the bowels and a nervous sedative, may cut short the pain.

In the nervous and periodical varieties seclusion in bed in a quiet dark room, with a cooling lotion or tight band on the head, sleeping if possible, and abstaining from food, may abort the attack. With others a hearty stimulating meal may do better. Gentle exercise is sometimes favorable; violent exertion is almost always unfavorable. When the extremities are cool a hot mustard footbath for an hour or more will be very useful and comforting. Certain nervines may ward off an attack, as guarana, one of the bromides, valerian, caffeine, etc. For a person not accustomed to using them a cup of strong coffee, or an alcoholic stimulant, spirits of chloroform, etc., may be helpful. These reme-

dies must, however, be taken before the stomach becomes too irritable to retain them. Indeed, sometimes they are entirely useless except as an emetic.

If the attack has fully set in, efforts must be restricted to lessening its severity and shortening its duration. Sometimes nothing will be of any particular benefit and the attack must simply be allowed to wear itself out. In others some relief can be had by hastening the evacuation of the stomach and bowels by emetics and injections, by rest and quiet, by freedom from light, sound and mental action, by heat to the extremities and cooling lotions and pressure to the head—such measures as have already been mentioned. In a few cases hot applications to the head are grateful. When the stomach is irritable sleep can be procured by the use of chloral in a rectal injection; this is especially serviceable in children. After the stomach is emptied, nausea may be allayed by very hot water, aromatic spirits of ammonia, spirits of chloroform, etc. Opium and its preparations should be avoided, because they often disagree, and because of danger of promoting the opium habit.

INSOMNIA OR SLEEPLESSNESS.

Inability to get proper sleep is an annoying and ever serious condition. Inasmuch as the physiology of sleep is not well understood, insomnia must be studied in connection with the condition by which it is caused, and its treatment will vary according to its causation. It may be caused by worry, anxiety, grief, etc., and in this form is often very intractable. It requires a good deal of tact and judgment on the part of the physician to determine how much dependence should be placed in drugs and how much in hygiene and diet. Indeed, where there is chronic business anxiety, or family or personal worry, it may be impossible to overcome the insomnia until the cause is abated. Sleeplessness from pain may depend upon neuralgia or neuritis, the first stage of certain inflammatory diseases, as pleurisy, pneumonia, peritonitis or rheumatism, or upon eye diseases, influenza and sundry brain affections.

Treatment.—The first step in treatment of insomnia due to the pain of acute disease is to properly treat the disease which causes the pain and to ascertain how much such treatment may relieve the sleeplessness. If the insomnia still continues the

hypnotics—chloral, sulphonal, trional, etc.—may be used alone or with bromide of potassium.

Fevers are frequently attended with sleeplessness, for which bathing, food and stimulants should be tried; if these are not successful, bromides and more active hypnotics may be needed. Nervous prostration is often accompanied with sleeplessness for which attention to diet, rest, general hygiene and simple quieting measures will be preferable to “sleeping medicines.” The sleeplessness of incipient melancholia is often one of the first symptoms of that disease and the treatment is that of melancholia.

A very common cause of sleeplessness is the use of tea, coffee, tobacco, alcoholic drinks, disagreeable foods, etc. It is very commonly recognized that many persons cannot drink coffee at night without lying awake afterward, but strong coffee in the morning only will prevent some persons from sleeping well. Some susceptible individuals may be rendered sleepless by tobacco, some by certain wines or liquors, others by particular foods.

The use of dumb bells, Indian clubs, or any form of vigorous exercise which quickens the circulation, thereby drawing the excess of blood from the brain, often quickly induces sleep in those suffering from study or too much mental work.

For sleeplessness attributable to errors in diet or drink, such errors must be corrected. When due to nervous restlessness without manifest disease, certain expedients may be useful. A warm bath, or in some cases a cold bath, at bedtime will materially aid in procuring sound sleep. Some persons sleep best after a very light supper; but the old-fashioned idea that one should go to bed hungry is often misleading. Many persons in fairly good health, others who are weakly or nervous, and many in incipient or even in settled melancholia, will sleep better for taking some light stimulating food at bedtime, like hot milk, milk and egg, egg-nog, etc.

Bathing, regulation of diet, exercise, avoiding disturbing influences and even food on retiring, may be tried as home remedies in simple sleeplessness, but if not successful the physician should be consulted. In acute diseases, fevers, etc., very little should be attempted, except under the direction of the medical practitioner. It is a most pernicious practice for one to attempt to doctor himself for chronic sleeplessness; dangerous drug habits are often acquired by so doing.

COMA.

Coma, a state of unconsciousness, is attendant upon several diseases which require immediate medical attention, and will receive only brief enumeration. The treatment will depend upon the condition which causes the coma.

Injury may produce either slight and brief, or very profound and prolonged coma. The injured person should be placed upon a bed in as comfortable position as possible, and prevented from getting chilled, and bleeding should be controlled by pressure until the arrival of the physician. Coma is one of the symptoms of disease of the kidneys. The victim of chronic kidney disease is likely to die comatose. Alcoholic liquors in excessive quantity will produce alcoholic coma, which ordinarily will pass away in a few hours, requiring only watching, protection from cold, or sustaining of the strength; but it may prove fatal.

Coma is also a symptom of brain hemorrhage—atrophy as it is usually called—and of other brain diseases, which will require the prompt attention of the physician, the patient receiving meantime the customary friendly ministrations. Coma, from any cause, shows a profound impression on the nervous system and must always be regarded as a serious symptom.

FAINTING.

Fainting is a temporary loss of control of the mental and bodily functions. In any case of fainting the patient should immediately be placed in a horizontal position in a draught of fresh air, and all tight clothing about the throat, chest and waist loosened. In many cases this will be all that will be required to restore consciousness, but if the restoration does not come very soon, cold water may be dashed into the face and upon the chest, and the extremities briskly rubbed to aid the circulation. A dinner plate may be dipped in hot water and quickly applied to the stomach, care being taken not to burn the patient. Too liberal use of ammonia, or other smelling salts, may do harm.

INSANITY.

By B. D. EASTMAN, M.D.

In some of the lower animals the several parts of the organism differ but little in structure or in function; but as we look higher in the scale we find the various parts of the body differing more and more, both as to anatomical structure and physiological function, until in man we see the widest differentiation and the most complex function; the various organs of the body each having individual offices to perform in the complicated association of phenomena called life.

The function of the stomach and digestive apparatus is to digest food and furnish nutrients to the tissues; that of the heart and blood vessels, to circulate the blood; that of the eye, to give vision, etc., but the most important and distinguishing attribute of man is the function of mentality carried on by the brain, especially by the superficial gray matter called the cortex. When the stomach and digestive apparatus are sound we have good digestion; if the heart and vessels are in good order we have good circulation; if the eye is normal there is distinct vision, and when the brain is sound we have healthy mentality or sanity. Indigestion, imperfect circulation, indistinct vision and insanity are results of diseased conditions of the respective organs, but these diseases do not necessarily imply entire annihilation of these functions. A good deal of indigestion is not incompatible with a long and useful life, but if the stomach be sufficiently diseased, its function will be entirely suspended and death will soon result. So, too, insanity does not necessarily end all mentality, and insane persons may live many years with their mental faculties deranged, but not destroyed; or, on the other hand, the brain disease which causes insanity may be so serious as to lead to a speedy death.

There is, however, a very important and wide-reaching peculiarity of disease of the brain wherein it differs from derangement of any other organ. Our mentality is that which distinguishes us from the brute creation, establishes our relation to each other and

to our environment, defines our individuality, and constitutes our personality—the “ego;” and as the brain is the organ of mentality, it follows that disease of this organ may change any or all the manifestations of the ego, not only in its relation to others and to environment, but in relation to itself. It matters not, in considering psychological problems, whether this ego be called soul, mind, matter or function; all the knowledge we have of it is through its manifestations, developed only through the action of the brain. It is sufficient to know that a diseased brain causes abnormal manifestations of the ego—the deranged mentality which is insanity.

To avoid confusion it should be mentioned here, that the brain has various departments and functions, as has been especially noted in a previous chapter. Serious, even fatal diseases of the brain may exist without attacking that part of the organ concerned in mentality and without producing insanity; besides, not every disturbance of mentality is termed insanity, but only such interruptions as last a considerable time. The delirium of fever and the incoherence of drunkenness are not considered varieties of insanity, although they may not essentially differ from it.

Insanity is a condition to be described, and one that cannot be satisfactorily defined, but it may be well to give such a definition of it as in a few words will most clearly convey to the non-professional reader its meaning. For this purpose insanity may be said to be morbid mental manifestations dependent upon disease of the brain.

That the reader may have a clear understanding of this subject, we will specify some conditions which are sometimes incorrectly considered as phases of insanity. Eccentricity is one of them. Not a few persons have during all their lives very peculiar, queer, but inoffensive ways of talking and acting—ways that are natural to the individual. These peculiarities in these persons do not constitute insanity. Other individuals have vicious, dangerous, criminal tendencies which are habitual and natural; these are not insanity. But if a person who has always been in the habit of talking and acting in the ordinary conventional way common to his rank and station in life, changes in this respect and talks and acts in a manner unusual and unnatural to him, it at once arouses the suspicion that he is insane. So, too, conduct that in one station in life is usual and natural, would, in some other stations, be

very unusual and unnatural, and presumptive evidence of insanity. It is common for the Hindoo mother to throw her child into the Ganges, a custom that indicates grossly perverted ideas, but not insanity. On the other hand, if an ordinarily happy, intelligent American mother drowns her child, it is strong evidence of mental derangement.

Thus, there are two general methods by which the question of insanity may be determined: The first is by comparing the person with his former self; the second, by comparing him with what is customary in his station in life. If, therefore, a person is found to have changed mentally from what is natural to him, or, provided his former personality is not known, he is found talking and acting in a manner not compatible with his station in life (sufficient moral causes, and the immediate effects of sickness and drugs being eliminated), such change or incompatibility is presumptive evidence of insanity. In applying the foregoing rules it is always important to exclude the conditions cited as exceptions. The arousing of religious sentiments may cause complete change in a dissolute person, or getting into bad company may change an honorable, law-abiding individual into a reckless criminal, yet in neither instance, could the person be called insane; but similar change without any adequate external cause would indicate insanity. The acute delirium of fever, or other disease, and the immediate effect of alcohol and other poisons, may induce a mental condition which is essentially the same as that of insanity, still as such a state is temporary and directly due to toxic agents, it is not classed as insanity; but the effects of disease of other organs, or the habitual use of alcohol or other drugs, may bring about a serious and continued brain disease, causing that more permanent mental derangement called insanity.

The disease of the brain which causes insanity may assume two fundamental forms: (1) Defective development. (2) Disease subsequent to development.

The development of a human brain-structure and brain power is a marvelous phenomenon, which distinctly marks the wide difference between man and the brute. Of the lower animals the young come into existence with the brain and brain-power fully developed, or complete development takes place within a very short time; thus, the chick upon leaving its shell immediately begins to run about, to seek food and to care for itself. It is possessed

of all the brain power it will ever have; there is no further brain development for it, and it can never accomplish anything more than its parent has done. But the infant is born with a brain incompletely developed physically, and without mental power. It is stimulated to the act of sucking, by reflex nervous excitation, when anything is placed between its lips, but it is only by a process of education that it learns to walk, to care for itself, to provide its food, or to equal or perhaps surpass its parents in accomplishments. The period of brain development is very much longer in the child than in the chick, both before and after birth, and the physical and functional development, infinitely more complex. This great complexity of the human brain and long period of development render imperfection or arrest of the process very frequent with resulting disorder of function; hence insanity from defective brain development. The complicated structure of a fully developed brain, its constant activity, the frequency with which it is overtaxed, and the stress put upon it by transgressing the laws of health, physical, mental and moral, render it especially liable to physical disorders from which follows insanity from disease of the brain.

Insanity from either of these causes assumes different forms, and it will aid us in their consideration to group them in a simple and natural way, as follows:

Insanity caused by defect in brain development.	{ Idiocy. Imbecility. Feeble-mindedness.
Insanity caused by brain disease after development.	{ Melancholia. Mania. Paranoïa Dementia. Paretic Dementia.

Idiocy, imbecility and feeble-mindedness are but different degrees of the same general condition. The brain defect to which they are due may be congenital or acquired. In the congenital cases, proper brain development is lacking, the child having been born with the brain more or less imperfectly formed, or even lacking in important parts. In such a case it is plain that the normal development of the brain, which should go on during infancy and childhood, is impossible, and that the subject of congenital brain

defect must always remain defective mentally. In acquired cases, the brain at birth has reached its then normal condition, but injury during the birth process, or accident or disease during early childhood, damages the brain structure and prevents subsequent normal mental growth.

There is no material difference in ultimate results between congenital and acquired defects of equal extent. In the most profound cases of idiocy there are practically no mental manifestations; only the vegetative, organic and simpler nervous functions exist. The child performs only automatic actions and is a very pitiable object. The higher grades of idiocy frequently exhibit, in certain directions, a good deal of memory and astuteness. They are often fond of music and may be extraordinary natural musicians, learning by ear and repeating by note intricate compositions, but they never become intelligent musicians. Blind Tom, the negro boy, exhibited a few years ago as a prodigy, was an example of the musical idiot.

By gradual steps idiocy passes into imbecility, and imbecility into feeble-mindedness, in the higher grades of which there is only slowness of development, backwardness and slight lack of mental capacity.

The causes of all these forms are varied. In congenital cases the immediate cause is arrest of development, but what underlies such arrest is not well understood. Heredity counts for much, and in certain families these defections are very common. Indeed, one of the best authorities says: "Idiocy is of all mental derangements the most frequently propagated by descent." Not unfrequently the heredity is not traced to the same condition in the parent, but to insanity, intemperance, epilepsy and other neuroses. Sometimes parents who seem to be untainted by any imperfection will have a series of more or less idiotic children from some unexplained incompatibility or incapacity for perfect reproduction. There is a widespread belief that consanguineous marriages are among the most common causes of idiocy and imbecility. In the popular mind the marriage of cousins is almost sure to beget idiocy; but the consensus of the best medical opinions is that consanguinity alone has very little to do with the production of idiocy. If the stock be sound and healthy in body and mind, cousins may marry without extra risk, but the real point is, that when near relations marry, any family tendency to physical or mental weakness

is greatly increased, because of the same influence from both parents; hence if the members of a neurotic family intermarry, the prospect for the offspring must be bad.

It occasionally happens that an infant's brain is injured by excessive pressure or by internal hemorrhage during birth, which leads to arrest of development. Meningitis, convulsions, epilepsy, hydrocephalus, infantile palsy and injury to the brain by fall, blow or other means, are the principal causes of acquired idiocy and imbecility.

As a rule neither medical nor surgical treatment of idiocy, imbecility or feeble-mindedness is of any avail. It is obvious that congenital brain defects cannot be remedied, but careful medical attention may prevent disaster to the brain, and prompt operation in some cases of injury to the head may prevent brain complications. In a few cases the relief of pressure by operation on an unyielding skull has proved beneficial. In most cases of defective mental development treatment is restricted to taking the best possible care of the patient, and is divided into two departments—the custodial and the educative. For the lowest classes the custodial feature is the most important; for the least defective the educational feature is of the most value.

The presence of an idiot or imbecile is a great detriment to the welfare of a family, and with increasing strength and developing propensities he may become a menace to the family and the neighborhood. The impossibility in an ordinary family of giving an idiot or imbecile proper control, protection and education, renders it best that such defectives be cared for in an institution especially designed for such cases, where experienced and competent custodians and teachers are provided. The amount of education which they are capable of acquiring varies greatly, some being able to make scarcely any improvement, while others can be made self-supporting. At the other extreme of these defectives are the feeble-minded or backward children, some of whom do not appear to be abnormal, excepting in their backwardness—a youth of ten or twelve may show only the capacity of a child of five or six. In an ordinary school these children are annoyed and embarrassed by being classified with their juniors, and are therefore best educated in special schools.

In some cases mental development is defective because deprivation of one or more of the special senses closes the usual

gateways of knowledge, and that part of the brain which carries on mental operations remains more or less inactive from lack of mental stimulus. This is called idiocy by deprivation, and has been likened to a seed which does not sprout because kept away from sunlight and moisture.

The cases of Laura Bridgman and Helen Keller, in whom all senses but that of touch, were destroyed by disease in early childhood and who were educated through this one remaining sense, show what patience and perseverance can do in early life; but if these cases are neglected till habits are formed little can be done for them.

We now come to the consideration of our second group: Insanity caused by brain disease after development.

Although insanity properly includes the mental manifestations of brain defect as well as brain disease, it is this second group to which the term insanity is usually applied. In this group of mental diseases there has been normal brain development and corresponding mental capacity, but disease has attacked the brain, it can no longer properly carry on its function, mentality, and the result is deranged brain function or insanity.

ILLUSIONS, HALLUCINATIONS AND DELUSIONS.

Before considering the different forms of insanity, it is desirable to explain certain terms used to designate some of the symptoms of mental derangement—illusion, hallucination and delusion. These terms, often confounded, have in mental medicine distinct and different meanings. An illusion is a false interpretation of an object actually present; an hallucination is a false perception of an object which has no real existence; a delusion is a false belief.

Any one of these forms of erroneous sensori-psychic activity may exist in a state of perfect sanity. The circle of fire seen when a burning stick is rapidly moved in a circle is an optical illusion, due to the physiological fact that an impression made upon the retina of the eye remains for a brief interval of time after the stimulation ceases; interpreting the moaning of the wind to be voices or noises of animals, is an example of auditory illusion. Hallucinations in health are most likely to occur in that half-sleeping state we call dozing, or in reverie, or when the mind, as of the artist or musician, is intensely occupied in its favorite study.

Hallucinations are common in ordinary disease. A lady, when a little run down in health, always saw, upon a certain stair, a black cat which was soon banished by a course of tonics. A fever patient who had been furnished that "never failing" hypnotic, a hop pillow, saw two of his neighbors bring into the room a hop pillow so large it would scarcely go through the door. As long as the mind corrects the abnormal sense-impressions, or estimates them at their true value, they are not indications of insanity, and do not lead to the false belief termed delusion. Indeed, many sane persons hold delusions which are due to faulty education, prevalent errors, station in life, etc.; but when, because of brain disease, the mind is unable by reason and judgment to correct illusions or hallucinations, they become evidences of insanity, and the belief in their reality constitutes insane delusions.

Delusion has already been defined as a false belief, and when such false belief is due to disease it becomes an insane delusion—or, as generally used in connection with insanity, simply delusion. It is the symptom of insanity which most strongly appeals to the ordinary observer, and was formerly thought to be essential to insanity; but although insane persons do not always manifest delusions, when a person claims to be emperor of the world, Jesus Christ or God, such delusions are striking symptoms of the mental disorder.

MELANCHOLIA.

Melancholia is a form of insanity in which there is great mental depression or melancholy, with depression of the bodily powers, mental distress, and often accompanied by suicidal impulse. Melancholia shows itself in four typical forms—(1) simple melancholia, (2) agitated melancholia, (3) hallucinatory melancholia, (4) stuporous melancholia.

Simple melancholia, in its mildest form, appears very much like an ordinary depression of spirits, but the facial expression of mingled woe, shadowy mental dullness and distrust, is so characteristic as to be readily recognized by an expert. Intimate friends and relatives will detect something unusual in the patient, but may not be able to explain in words the changes. The usual sources of pleasurable sensation, such as family associations, business responsibilities, accustomed recreations, pleasing sights, sounds, odors, etc., become causes of mental distress and pain. Every sensory impression, which in health would give pleasure, is

distorted by the deranged brain into something distressing and mournful. Hence the patient evinces no pleasure in anything, and can scarcely be induced to smile. There is also obstinate sleeplessness and a dull aching pain in the back of the head and neck; the memory is not usually impaired and the occurrences of the melancholy period can generally be recalled. Most cases of simple melancholia are without hallucination or illusion.

In hallucinatory melancholia the melancholy is much more marked. In addition to painful mental sensations, the patient has distressing hallucinations and illusions. Every sensory impression from the organs of special sense, and from every part of the body, are converted into terrorizing hallucinations and illusions. Delusions of an introspective and self-accusative character take possession of the patient, and he bemoans his imaginary undoing. These patients have the delusions that they have nothing to hope for, that they are excessively wicked, that they ought not to eat, that their food is mixed with poison or the most noxious and offensive filth, that the meat given them is human flesh, that they will bring misery upon their friends, that they have committed the unpardonable sin, etc. They also have delusions of personal injury, that they are to be tortured, and the like. One of my patients had the delusion that a circular brick room, like a cistern, with several openings in the sides, was being built as a place of torture for her; that she was to be placed therein, and that heated irons were to be thrust through the holes into her person. Indeed, the variety of delusions which are entertained by melancholiacs is well nigh limitless. The fear of personal injury, the apprehension of bringing disaster upon relatives and friends, the load of imaginary crime, and the belief of utter spiritual hopelessness, frequently causes the patient to become excessively and almost constantly agitated, constituting the third form of this disease, agitated melancholia. These patients are almost constantly agitated, wringing their hands, throwing themselves about, crying out, bewailing their fate, incoherent, and perhaps violent.

In stuporous melancholia the patient becomes inattentive, mute and motionless early in the disease. The mental powers appear to be benumbed by the terror which has seized upon him.

There are certain important characteristics which appertain more or less markedly to all forms of melancholia and deserve brief consideration. These are insomnia, post-cervical ache, precordial

fear, loss of weight, violent outbreaks, suicidal and homicidal tendencies.

Insomnia (sleeplessness) is almost always a precursor of and an attendant upon melancholia of any form, and is very commonly one of the earliest preliminary symptoms. In some cases it is almost complete and is frequently very obstinate.

The post-cervical ache is a dull, heavy, ill-defined, variable, aching pain in the back of the head and neck, and is generally present in the simpler cases of melancholia. Precordial fear is a feeling of apprehension or fear, referred to the breast over the region of the heart. This is a reflex nervous phenomenon, and is similar to the feeling which any frightened person has in this region. These two nervous phenomena are more noticeable in the simple cases than in those of greater severity.

The general impairment of the vital forces in melancholia causes derangement of the function of digestion and assimilation and leads to interference with nutrition and loss of weight, which is sometimes very great. In acute cases, increase of weight is a very encouraging indication; but in some chronic cases accompanied by loss of mental power (dementia) increase of weight occurs without mental improvement. In most cases of melancholia, especially those affected with precordial fear, there is liability of violent outbreak. The feeling of apprehension, fear of personal injury, etc., becomes so great that the patient seeks to save himself, or revenge himself, or blindly gives way to aimless violence. The most quiet and apparently apathetic case may become violently excited in an instant and prove very dangerous.

The logical outcome of morbid mental depression is suicide. The victim sees no respite from his tortures, no relief from his sufferings, and his thoughts naturally turn to escaping his troubles by ending his life. This danger is always imminent in all cases of melancholia, even of the mildest sort. It is extremely difficult to make the friends of patients appreciate this. Not only is there danger of suicide, but of homicide as well. The daily papers frequently record instances of a whole family being killed by a parent who then takes his own life, although not previously considered sufficiently insane to be sequestered. In general, the underlying idea is some phase of the delusion that it is better to put the whole family out of the way than to let them live to suffer. A very worthy Christian woman in profound melancholia tried to

kill her attendant. After recovery she clearly remembered the chain of reasoning, which impelled her to the act. She thought that as long as she herself lived she would bring sorrow, sin and shame to all around her, and that she would be doing less harm and committing less crime by taking her own life, even if she had to kill her attendant to accomplish it.

Simple melancholia, in many cases at least, seems to be a self-limited disease, i. e., one that after a time tends of itself to recovery. This may take place in three months, or in twelve or eighteen. Other cases which at first seem to be simple, develop into more serious forms. The most experienced alienist cannot tell in the beginning of a simple case to what form it may change, or what will be the final outcome.

The causes of melancholia are heredity, grief, trouble, mental and physical overstrain, disease of the digestive apparatus, fevers, childbirth, worry, etc. These causes act to produce insanity by the strain of overwork or the lack of proper nutrition which they put upon the brain, and thus start the brain enfeeblement which is manifested in the insanity. The one word which best covers all these cases is stress. The brain is capable of doing a great deal of work, provided it is properly nourished and gets proper opportunity for recuperation. Worry is rapidly exhaustive. Hence long vigils at the bedside of sickness and the distress which follows the loss of near friends, the sleeplessness and worry over financial loss, the imperfect nutrition dependent upon dyspepsia, the toxic effects of fever, the exhaustion of childbirth and lactation, worry of domestic trouble, etc., throw undue stress upon the brain, derange the proper relation of waste and repair, and thus bring about the disordered function which is insanity.

In melancholia of the milder forms the prospect for recovery is favorable; in the severer forms, less hopeful, although very severe cases sometimes make good recoveries. Simple cases, especially those following fever, etc., may completely recover in a few weeks; others, after two or three years. I have known one case to recover after seven years, and instances are on record of recovery after still longer periods. The average duration of curable cases is about nine or ten months.

A case of melancholia should be treated by isolation, nursing and watching. Occasionally an incipient case can be diverted and health re-established by travel and change of scene, but if the case

has become one of distinct melancholia, travel not only does no good, but is positively harmful. If the patient be in a condition to have the mind occupied and the attention taken up by travel and new scenes, good will be derived therefrom; otherwise, harm will result.

As a rule it is far better that the nurses and attendants in care of a case of melancholia be strangers, with experience in the care of the insane. If the resources of the family warrant it, and isolation, nursing, watching, and competent medical attendance can be had at home, home care can be undertaken and successful result expected; but this method is practicable only in wealthy families in large cities. In most cases the asylum offers the best solution. Many families, who are prosperous when all are well, are entirely unequal in many respects to the demands of home treatment of the insane; hence the home treatment of melancholia will be limited, practically, to the incipient stages. Even here the case should have very careful watching, and the family physician should be very attentive. The mild cases are even more dangerous as to possible suicide, homicide, or arson, than the severer ones, for the latter plainly show their condition, while the former, retaining their reasoning power to a large extent, are able to plan desperate schemes with as much cunning and deliberation as a person in sound mental health. Besides, such patients are liable to suddenly develop morbid impulses, the sight of a weapon may suggest suicide or homicide—the sight of the children suggest that it would be a blessing to them to be removed from a world which seems to be shrouded in gloom and woe.

The greatest care should be taken to prevent suicide by removing from the patient's domain everything liable to be used for this purpose, and watching most carefully against sudden precipitation out the window or downstairs. A melancholy patient has been known to disembowel herself with scissors, while her nurse was sewing by her side.

In nursing, three points are very important—to keep up nutrition, to keep the bowels open, and to keep the function of the skin active. Acute melancholiacs generally take but little food willingly and often refuse it altogether, partly because the mind is preoccupied, partly because the organic sensations are dulled, but more especially because of delusions, that poison is mixed with the food, or that the meat is human flesh, or that they

are too wicked to eat, or if they do eat there will not be enough for others. It requires a great deal of tact and experience to get such a patient to take sufficient food. Sometimes it is impossible, and recourse must be had to forced feeding by the stomach or nasal tube. Milk, milk and eggs, clear soup slightly thickened with arrowroot, strained pea soup, etc., should be given with the tube three or four times a day, to which stimulants, digestives, laxatives, etc., can be added as required. Patients have been nourished in this way for months, or even years, and ultimately restored to health.

To combat the constipation, laxatives, especially those which increase glandular secretions and stimulate the muscular movements of the intestine, enemas and massage of the bowels, are to be used. The frequent use of the ordinary warm bath, followed by general massage with inunctions of oil, will keep the skin in reasonably good order and aid the nutrition. Incidentally, it may be said that the hair in melancholia is generally dry, harsh and rough, and that improvement in its condition is an indication of mental gain.

It will be clearly seen from the foregoing that, in the great majority of cases, home treatment will not be practicable, and that recourse must be had to some institution, especially adapted to the care of the insane. Having determined it to be best to send the patient to an institution, select one, if you can have a choice, under the care of an experienced and competent alienist, place the patient therein, then follow the advice of the superintendent as to visiting, writing, etc. As a rule melancholy patients, especially in the early part of treatment, are made worse by visiting and letters, and both should be prohibited. Later, a time may come when both visits and letters will be beneficial. After recovery from an attack of melancholia care should be taken to keep the general bodily health good, and to avoid brain stress of every kind, lest another attack be provoked.

MANIA.

In mania, we have the exact opposite of melancholia. It is characterized by an exalted emotional state, together with exaltation of other mental and nervous functions and motor excitement. The patient appears to be unnaturally quick-witted and talkative; ideas come so rapidly he may not be able to find words to express

them and therefore seems confused; he talks vehemently, with exaggerated facial expression and gestures, and he is restless and continually on the move. The patient's appetite and digestion are good and his spirits high. He is happy and contented, forgets care and trouble, and becomes oblivious to usages of society and restrictions of law. Both men and women throw to the winds their natural reserve and modesty, and deport themselves with unaccustomed freedom and inattention to propriety. In the early stages of mania the patient appears as though slightly intoxicated. Some cases may never go beyond this stage; others may go on to a condition of furious, dangerous excitement in which the patient yells, dances, tears his clothing, smashes windows and furniture, brooks no interference, and sometimes attacks others with great fury and violence.

Mania is sometimes preceded by an attack of melancholia from which the patient appears to recover and regain his natural spirits, but he passes the normal state and goes into a condition of excitement. In other cases there is a preliminary period, of from a few days to a few weeks, of restlessness, eccentric conduct, disturbed sleep or sleeplessness, loss of appetite, and dull headache, in which the patient is unable to properly concentrate his thoughts, and feels an incapacity to attend to his usual business. In typical cases this condition lasts from one to three months, although at the last there may be a sudden, violent explosion.

Mania shows itself in two forms—simple mania and hallucinatory or delusional mania.

In simple mania there is excitement, quickened mental operation, unnatural good humor, excessive talkativeness, restlessness, etc. Delusions, illusions and hallucinations are absent, or if present at all, are slight and vague. In hallucinatory or delusional mania the hallucinations and delusions are prominent, dominate the patient and control his actions.

Mania may be acute, subacute or chronic. In acute mania there is generally great excitement, constant talking and motion, with tendency to violence, easily provoked to outrageous acts. Subacute mania is less active and violent. Both the acute and subacute forms may lapse into the chronic, persistent form.

The duration of mania varies. Very intense cases may last but a few days, ending in recovery or death. Milder ones may last from a few months to two years, and end in recovery. Of typical

cases of simple mania sixty to eighty per cent may be expected to recover; hallucinatory cases are not as likely to recover. About four or five per cent prove quickly fatal from the general bodily disorder, accompanying the mania, pneumonia, or other complicating disorders, or from depression of all the vital forces called maniacal exhaustion. Cases which neither recover nor die, lapse into chronic mania or into dementia.

The causes of mania are much the same as those of melancholia—heredity, mental and physical overexertion, febrile diseases, childbirth and intemperance being among the most common. In the treatment of mania very mild cases can be cared for at home, provided the resources of the family are equal to the expense. There is even less danger of sudden exhibitions of violence than in melancholia, but the restless activity of these cases is likely to create a great deal of disturbance. For the more severe cases home treatment is inapplicable. Taking it all in all, most cases will require asylum control. Occasionally a puerperal woman is suddenly seized with violent maniacal symptoms which will disappear in two or three days by proper home treatment; but if the symptoms do not quickly abate, isolation in an asylum will be best.

The medical treatment should be directed to regulating any disordered bodily function, to the calming of nervous excitability, relieving sleeplessness and keeping up bodily nutrition. As a rule, mild cases of mania take food well and maintain good digestion, but in the more violent cases food is neglected from inattention, or refused from delusions or absolute loss of appetite, and forced feeding may be required. As there is great activity of mental and physical processes, a large amount of easily digested food will be required and alcoholic stimulants will often be necessary. The nervous excitement must be quieted by suitable nerve sedatives and the sleeplessness overcome by hypnotics. In cases of very high maniacal excitement the vital powers are greatly prostrated and the patient must be kept in bed by relays of nurses or, what is less irritating to him, by some form of mechanical restraint. In these cases great attention must be given to keeping up nutrition and strength to avoid death from exhaustion. On the other hand, if the excitement is not great and the strength is good, exercise to the point of fatigue will often be beneficial by keeping the digestion good, and securing sleep.

PARANOIA.

A form of insanity, which has been variously named, is now generally called paranoia. It is classed by some writers with idiocy and imbecility because of the defective nervous development, which is one of its peculiarities; others include it with the forms of insanity, which depend upon brain disease. It really appears to partake of both forms. Paranoia is a form of mental disease, dependent upon a defective nervous organization, either congenital or acquired in early life, and characterized by delusions and self-exaltation, which do not cause emotional or ideational excitement or impairment of memory, but which dominate the mental operations.

The victims of this form of insanity are peculiar, even in childhood. They may be good scholars, but are eccentric, conceited, introspective and not well balanced. Following some trifling sickness, disappointment, disagreement with a playmate, some business complication, etc., or without any known cause, the patient becomes vaguely suspicious and depressed, with feelings that others are trying to deprive him of his property or rights. The natural consequences of inattention to business are thought to result from conspiracy against him. "A patient in this condition enlisted in the army. He felt himself watched and checked in his laudable undertaking on every hand, and believed that the generals of the army—Sherman and Grant—were conspiring to keep him in the position of private, and to prevent that reward by promotion to which his abilities and meritorious conduct entitled him." This stage of the disease is sometimes called the "persecutory stage." Later comes the "transition stage," when some event, emotion, hallucination, dream, paragraph, conversation, or the like, may fix itself upon the patient's attention and seem to explain the whole movement of his life. Delusions multiply; he imagines his course of life has been specially planned out for him, by occult processes, for some great end; imagines himself to be of noble birth; or even a prophet, or Christ; that he has a wonderful mission to perform. He studies the Bible for hidden meanings applicable to himself; believes the cause of his having been "persecuted," or "tried," to be envy and maliciousness. He begins to formulate the great mission he is to accomplish. Some notion of his own, or some public incident, claims his attention and dominates and controls his actions.

These people are often looked upon as cranky, or harmlessly insane, but their quiet conduct, business ability, rational conversation on general topics, good memory, etc., hide their slumbering fire of delusion and obscure the dangerous tendencies—for these patients are exceedingly dangerous and only require the stimulation of some public event, personal collision or crystallizing delusion, like a spark to gunpowder, to precipitate some appalling explosion. A good example of this form of insanity and its violent culmination, is that of Prendergast, the assassin of Mayor Harrison of Chicago, who was stimulated to the deed by the idea that he had been appointed to champion the cause of the populace, to release them from the oppression of the mayor, etc. In short, he claimed that he killed the mayor for the benefit of the people at large, and not from any personal or selfish motive. Many other assassins, and would-be assassins, of distinguished persons have been paranoiacs.

These patients sometimes follow and annoy ladies whom they believe to be deeply in love with them, even though they have never exchanged a word with them. They may take the notion that the wealth in the possession of some noted millionaire is really their own, and take measures to secure it by threat or force. Such patients are found in every rank of life, and often impose a long time on intelligent persons, especially on ladies, ministers and lawyers, until they are rudely awakened to the person's real condition by some sudden desperate act. The only safe disposition of this class of insane is seclusion, which is sometimes impossible to secure till homicide has been accomplished. It follows as a matter of course that this form of insanity is not very curable, although a cure, or at least a remission for long years occasionally takes place.

DEMENTIA.

Dementia signifies loss of mind. It is very commonly used by the public, and in legal proceedings, to signify any form of insanity, but by alienists, its use is restricted to certain forms of mental derangement, which frequently follow more active types and which show, as the most prominent symptoms, an impairment of mental power. The term is often confounded with idiocy, and while certain forms of dementia do not differ materially from idiocy, the two conditions are reached by different routes. The idiot has never developed mentality; he has always been weakminded—the

dement has been the possessor of normal mental power, which has become impaired by brain disease.

Dementia will be considered under three forms—primary dementia, terminal dementia, and senile dementia.

Primary Dementia, also called stuporous insanity, is a form of mental derangement evinced by a more or less marked weakening of the mental powers, not secondary to any other form of insanity, but coming on as an original mental disorder in a person previously of sound mind. This form of insanity may come suddenly from some overwhelming mental shock and reach its height in a very short time, or it may come on gradually, perhaps with periods of remission or intermission. In the slowly developing cases the patient loses interest in what has usually interested him; he grows careless in dress and habits, displays excessive grief or joy at slight occurrences, finds difficulty in fixing his attention, becomes forgetful, unable to attend to his usual occupation, and incoherent both in speech and writing, loses his sense of modesty and decency, neglects the calls of nature, etc.

This form of insanity is seen only in young persons, who, as a rule, have not passed their twenty-fifth year, and have inherited tendencies to insanity. It is very likely to depend for its immediate cause upon masturbation, inanition, exhausting discharges, etc., or gradual or sudden exhaustion of the nervous system. It ends in recovery in a majority of cases in from two or three to five or six months; the younger the patient and the more sudden the onset, the more rapid the recovery. Cases caused by masturbation are the least favorable. Cases which do not recover, lapse into the dull, apathetic form of terminal dementia, frequently complicated with pulmonary disease.

The treatment of these cases consists of good nursing and great care-taking, liberal feeding, with reconstructive tonics and stimulants to invigorate the weakened brain.

Terminal Dementia—Cases of acute insanity may terminate by recovery, by death from exhaustion, or by becoming chronic and incurable. The first two classes are obviously removed from the ranks of the insane; the chronic and incurable residuum is what constitutes the mass of insanity, which exists at any one time, and which fills our asylums and receptacles. Cases of chronic insanity sometimes retain to a greater or less degree the symptoms which marked their acute stage and become, therefore, chronic

melancholia, chronic mania, etc., but the majority of uncured cases tend to an impairment or weakening of the mental powers—that is, to a decay of the mental faculties. This mental enfeeblement, consequent upon a preexisting acute insanity, is called terminal dementia.

Terminal dementia may vary in degree from but slight mental impairment to complete fatuity. Employment of both body and mind helps to postpone mental decay, and in public institutions for the insane chronic cases are encouraged to work, mainly for the benefit which occupation brings to the patients and only incidentally for the value of their labor. Many of these cases, under the guidance, control and support of the asylum, prove excellent helpers, but they rarely do as well at home, and are incompetent to meet the exigencies of ordinary life. Those who are extremely demented require to be taken care of like children, and are often very untidy and destructive.

There is no medical treatment for terminal dementia. The brain has suffered irreparable damage, and the most that can be done is to preserve, by judicious management, as long as possible, what mental power is left. The illusions, hallucinations and delusions, as well as the morbid impulses, fears and tendencies, which existed in the acute stage of the insanity, may continue to exist in the terminal dementia until the mind becomes too weak to retain them.

Senile Dementia.—The natural history of the bodily organism is a period of growth, a period of maturity and period of decay. This is especially marked in the brain, the most complex organ in the body. Keeping step with these material changes there is in infancy, youth and adolescence, a period of mental growth and development, in middle life a period of mental maturity, and in old age a period of mental decay. This mental decay of old age is called senile dementia. The first symptom noticed is almost always a weakness of the memory which is followed by other evidences of failing intelligence. The patient fails to recognize his old acquaintances, or even his own children. He forgets where he lives, cannot find his way from room to room in his own house, and repeats the same question or story over and over, forgetting that he has previously voiced the same words.

The age at which senile dementia spontaneously makes its appearance varies considerably: it is rarely seen before the sixtieth

year, generally not till the sixty-fifth or seventieth, and sometimes not until much later. There is also great difference in the degree of senility and the rapidity with which it develops; some persons at eighty-five being as vigorous as others at sixty. Wounds, injuries, wasting diseases or excessive use (comparatively) of the mind, may bring on senile changes as early as the fiftieth year.

This ordinary senile mental decay can scarcely be regarded as pathological or as insanity; but it not unfrequently happens that radical changes in character and disposition are the first indications of senility. Such changes continue to be the most prominent symptoms and may take on a serious, dangerous or homicidal character. The liberal husband and father becomes penurious and miserly, refusing to provide his family and himself sufficient food to prevent starvation; or he may become prodigal and squander his means on disreputable characters with whom he had never been accustomed to associate. He may attempt to destroy property by fire or otherwise, or may endanger the lives of his family.

When these unnatural and unusual mental symptoms occur, it is clear that the brain changes have been of a pathological or diseased character, and that the condition is one of insanity instead of natural decay. These cases of real insanity should be protected from doing harm to their property, to themselves and to their families, by being adjudged insane, by having a guardian appointed to look after their business interests, and by sequestration. Very old people do not, as a rule, well bear being sent to an asylum. It seems to act upon them like the transplanting of an old tree. The removal from long-time associations and surroundings is a shock from which they may never rally, and they may survive but a short time.

In a case of this kind in a wealthy family, to which I was called in consultation, I had a whole house set apart for the invalid, his nurses, housekeeper, etc., from which the other members of the family were excluded. The result was satisfactory; the old gentleman became quiet and manageable, and ere long passed away at his own home. But it goes without saying that such a method must be expensive, and that with people of limited resources the restraint of the asylum offers the only practicable solution of such a problem. It also follows that senile decay, both of the body and mind, can terminate only in death, and that treatment must needs be limited to smoothing as much as possible the rugged pathway.

PARETIC DEMENTIA.

(General Paralysis. Paresis.)

Paretic dementia is a form of insanity characterized by progressive mental enfeeblement, muscular inco-ordination, delusions of wealth and grandeur, ultimate decay of mental and bodily powers, and death. It is a disease of the most vigorous period of adult life, occurring most frequently between thirty-five and fifty years of age. It attacks men much more frequently than it does women, the proportion averaging about six men to one woman. Its victims are as a rule among the most active and vigorous; it rarely attacks the sickly and feeble, and rarely follows other forms of insanity. It is most likely to occur in persons who have imposed too great burdens upon the nervous system, by overwork, intemperance, sexual excess, etc., resulting in exhaustion of nerve force, or from syphilis, which sets on foot subtle organic degenerative changes in the brain cells. The brain disease which underlies this form of insanity is easily demonstrated as an inflammatory degeneration of the cortex (gray outer portion of the brain), which is the portion essentially engaged in mental operations. A patient attacked by paretic dementia, at first shows slight mental defects, such as forgetfulness, carelessness in dress and behavior, irritability, loss of delicate shades of refinement, etc. He soon becomes erratic and visionary, full of expansive ideas of business and impracticable schemes. He becomes extravagant and wasteful of his means and squanders property in foolish ventures. He begins to have a thickness of speech, slurring or dropping letters or words like a partially intoxicated person. Indeed, these early symptoms of paresis are often mistaken by the patient's friends for evidences of excess in drinking. Then comes a tendency to appropriate anything within his reach, under the idea that it belongs to him. The patient, also, becomes very irritable and violently resents interference; and there may even be maniacal attacks of great violence. Delusions of wealth and grandeur multiply apace, until he believes he is the strongest man in the world, that he controls every business, that he is possessed of untold millions, that he owns gold and silver mines yielding him train loads of these metals daily, etc. These expansive delusions are likely to take a tinge from the patient's previous occupation, thus a stonemason thought he was to build a stone bridge across the Atlantic; a locomotive engineer claimed to have an engine, the cab of which was hollowed

from an enormous diamond, which laid its own track and would run to England in twenty-four hours; and another claimed to have an engine with cylinders five hundred inches in diameter, driving wheels five hundred feet across, and a flag-pole on the cab five hundred miles high.

The muscular inco-ordination and paralysis increase until the patient is unable to articulate, to walk, or to help himself at all. Apoplectiform or epileptiform seizures occur. Death may come suddenly in one of these seizures, or gradually, from slow exhaustion and general failure of nutrition, often with the development of bedsores upon prominent points, or even the sloughing of an ankle where the other has lain across it. At last the patient is as helpless as an infant, and when unable to help himself and scarcely able to speak, will still answer, in reply to the question: How are you? "A—all r—ri—right." Occasionally a case is seen in which the delusions are of a depressing nature.

There is no cure for paretic dementia. Remissions sometimes occur in which the patient, under control, may seem to be almost restored, but, on attempting to resume an active occupation, breaks down at once. The average duration of this disease is about three years, but occasionally a case runs its course in a few months, or on the other hand, may last ten or twelve years. It is well nigh impossible to care for this form of insanity in an ordinary home, and the institution affords the best recourse.

GENERAL CONSIDERATIONS. PREVENTION.

The classification of insanity as here given is considered sufficient for our purposes. Much more elaborate classifications are used by specialists. Certain views touching insanity, and some peculiarities which attend many cases, deserve a brief notice.

Lunacy is an old name for mental derangement, founded upon the idea that it is caused by some malign influence of the moon (*luna*). The only influence, however, that the moon has on insanity, is the same that it has upon some sane persons who sleep lightly—namely, some sane as well as some insane people are more wakeful in bright moonlight nights, simply because of the light.

Certain cases of insanity have a more or less marked periodicity. Melancholiacs are more depressed in the early morning, simply because the vital forces are less active at that time, and the worry of a sleepless night then culminates. Suicide is especially

to be guarded against in the early morning hours. In women menstruation is generally suspended during acute insanity. The arrest of menstruation is not the cause of insanity, but a consequence of it, or rather a consequence of the profound depression of the vital forces which accompanies the insanity. Hence the restoration of this function is a good sign because it shows recuperation of vital force. In some cases of acute insanity and in many of chronic derangement, menstruation continues and the manifestations of insanity are intensified at the menstrual period.

Certain persons are subject to frequently recurring attacks of insanity—recurrent melancholia or mania, the latter being more common. Generally the attacks grow more frequent and of longer duration, and finally produce more or less marked dementia. At first these attacks may be several years apart and the patient be entirely well in the intervals, but ultimately they have to remain continuously at the asylum.

There is a form of insanity, manifested by the alternations of excitement and depression, called circular insanity. The circle of changes may occupy a few weeks or many months, and there may be a period of considerable duration, in which the patient appears almost natural; but whenever this vicious cycle is once set up recovery is well nigh hopeless.

Epilepsy may continue many years without impairing the mental faculties, but usually the mind soon becomes affected, and epileptic insanity supervenes. Epileptic insanity and the automatic mental state which may precede or follow epileptic attacks, constitute a violent and very dangerous form of mental disease, and one very likely to lead to homicide.

The stress of the puerperal state not unfrequently causes insanity, especially in those predisposed thereto. This insanity may assume the form of melancholia or mania. It is especially important in puerperal insanity to be very watchful, lest the woman injure herself or her child.

The use of alcoholic drink may cause several different forms of insanity: First—The condition of acute inebriety, drunkenness, not usually classed as insanity because of its brief duration. Second—Delirium tremens, a violent acute apprehensive delirium. Third—Ordinary acute mania. Fourth—The so-called alcoholic insanity characterized by change of character, suspicions, marital jealousy, etc. Fifth—Chronic degeneration, of the type of senile

dementia or general paralysis. Similar conditions follow the use of other drugs, such as morphine, chloral and cocaine.

Years ago the belief was general that the insane were subjects of demoniacal possession, hence grew up a fear of the insane and a tendency to cast them out of the realms of friendship and of hope. It is now known that insanity is but the manifestation of bodily disease, yet the old feelings regarding it have not all passed away. By many, at the present day, insanity is looked upon as a disgrace and the going to an institution for the insane regarded as a stigma. But insanity is no more a disgrace than any other sickness. When other illness comes upon one as the result of evil-doing, of bad habits, of dissoluteness or dissipation, it is a disgrace inasmuch as it is a badge of disreputableness; but sickness that comes unavoidably is a misfortune, not a disgrace. Exactly the same distinction holds good with insanity. It is disgraceful when the causes which brought it on are discreditable, otherwise it is simply a misfortune, but as insanity affects the highest distinctive human attribute, mentality, which is the gauge of the individual's personality, the ego, it is a much greater misfortune than ordinary bodily disease. Furthermore, insanity is much the most troublesome of all maladies to care for, because of the peculiar difficulties and dangers which attend it. The delusions of the insane which are liable to attach to their best friends, the refusal of food, the violence, the danger of arson, and of suicide and homicide, render the care of the insane particularly difficult, especially at home.

In very young persons whose after-life might be clouded by having been sent away as insane, in very old persons who have but a short time to live, in puerperal cases where convalescence may occur in a few days, and in cases where mental failure in general bodily disease evidently precedes dissolution but a short time, the patient should be cared for at home if possible; but even here, the question of financial resources, strength, house-room, etc., may be controlling, and necessitate sending the patient away.

Originally, institutions for the insane were only receptacles for secure custody, and chains and dungeons were of common use. But science and humanity have wrought great changes, and asylums are now (generally) organized and conducted for the most enlightened and curative treatment of this unfortunate class. Years ago, when hospital was a rather forbidding word with unpleasant associations, it was avoided in connection with the insane and the,

then, softer word asylum was preferred. Now, that the public is better educated as to hospital work, the tendency is reversed and in many states asylum has been changed to hospital. Of late years there has been increasing attention given to the medical treatment of mental disease, nevertheless the chronic hopeless cases will always outnumber the acute and presumably curable ones, ten to one. The new cases, as they arise, necessarily speedily divide into three classes: those which soon die from the violence of their disease, those which recover, and those which become chronic and incurable. It is this residuum of unrecovered cases which constitutes the great mass of existing insanity.

There have been very widely divergent views as to the curability of insanity. At one time the popular belief was that it was very seldom, if ever, cured. In the early part of the nineteenth century, the great improvement wrought by the modern humane treatment of chronic cases, together with the enthusiasm of asylum superintendents, led to the claim that nearly all could be cured, provided they were properly treated in the early stages. More thorough and candid study shows that of the cases as they arise, just about one-half recover. The public still holds erroneous ideas as to the curable cases. Many, many times have patients been brought to me with the statement: "There is not much the matter with this man, he has been acting a little queer for two or three years, but has been able to attend to his business until the last few weeks; he will soon be all right again." The fact is, such cases are very unfavorable. On the other hand, cases of acute rapidly developing mania or melancholia give a large percentage of recoveries.

The asylum, or hospital in some form, has a twofold function: the cure of the curable and the custody of the incurable. As a rule, it affords the best prospect of cure for several reasons: The medical officers have had long experience in treating mental diseases; the nurses, attendants and other employes are trained in the work; the dangers are very largely eliminated, and the insane generally accept care and control at the hands of strangers with much less objection and irritation than from relatives and friends.*

* When institutions for the insane, and other defectives are made political perquisites and with every change of administration a new set of campaign strikers, inexperienced and untrained in the work are put in charge, great wrong is done the insane, their friends and the state. The public should protect itself against such maladministration.

As far as chronic and incurable cases are concerned, the function of the asylum is simply custodial. Generally, cases of chronic insanity are very troublesome, if not dangerous, at home, and exert a decidedly unfavorable influence, especially upon the young. As a rule, therefore, the chronic cases would better be in the asylum, but some cases under favorable conditions do well at home.

The insane are the wards of the state, and the state therefore establishes and supports institutions for their care. These asylums generally provide good treatment and good care for their inmates, are generally managed by experienced superintendents for the benefit of the patients, and are worthy of confidence. There should be no exceptions to this rule. While public institutions should, and generally do, give good care, they are necessarily managed economically and nothing is expended for luxuries. For those who have abundant means and desire to furnish insane friends with accustomed luxuries, there are private institutions worthy of confidence.

The insane are sick persons, and whether or not to send a lunatic to an institution, is essentially a medical question which should be decided by the physician, just as he decides the ordering to bed of a fever case, or the kind of splint to put upon a fractured limb. Unfortunately, in many states this purely medical question has been delegated to the courts and its solution savors of criminal jurisprudence. The victim of brain disease has to be tried for and convicted of insanity, and goes to the asylum with the idea that he has been sentenced as a criminal. Inasmuch as property interests are often affected by insanity, it is desirable that there be some judicial cognizance of this condition when it exists. The best way to meet the medical and judicial requirements in a case of supposed insanity, would be to have the court appoint a medical commission which should examine the case and report, then have the court act upon their report.

Insanity is especially a disease of modern times and of high civilization. Uncivilized people put but slight tax upon their mental machinery, hence develop very little insanity; but among the leading nations of the world, emotional strain, business cares, financial worry, dissipation, etc., are liable to lay that stress upon the brain which is the immediate cause of insanity. The proportion of insane persons varies: the maximum, about three in one

thousand of population, being found in the older and more densely settled states or countries.

An ounce of prevention is better than a pound of cure, runs an old adage, and to nothing does it apply better than to insanity. A large proportion of mental derangement is hereditary. This does not mean that in all cases of hereditary insanity, the subject is born insane. The congenital idiot or imbecile is born defective, but children are not born insane, in the common acceptance of the word. But just as there runs in certain families a tendency for the children as they grow to adult life, to develop certain family peculiarities as to hair, color of eyes, shape of features, tone of voice, and movement, so there runs in families a tendency to the development of different diseases, as rheumatism, gout, consumption and insanity. Persons who inherit a tendency to insanity are much more liable to become insane than those who do not; and insanity in such persons is very likely to be developed under the strain incident to the critical periods of life, as puberty, adolescence, climacteric, or the special stress of child-bearing, or of emotional strain.

It goes without saying that if all persons who inherit tendencies to insanity were to refrain from entering the marital relation the result would greatly lessen the amount of insanity in coming generations. In a few instances we have known persons to deliberately determine against marriage on this account, but people generally are not controlled by such lofty ideas.

The foundation for mental derangement is frequently laid in infancy and early childhood through failure of parents to teach their children proper self-control. Allowed to grow up without learning the important lesson of self-denial and self-mastery, they are liable, by vicious physical and mental indulgences, to sow the wind, that in the harvest time of later life, becomes the whirlwind. Overwork, the unrelenting tasks of poverty, unrestrained ambition, irregular life, dissipation, struggle for supremacy, the exactions of complicated and harassing business, inattention to the laws of health, excessive grief, etc., are likely to prove excitants which may produce insanity with or without predisposing causes. With a sound body will be associated mental integrity. When all observe the laws of physical, mental and moral hygiene, insanity will be rare.

GLOSSARY.

For words defined in connection with their use in this work, consult the index.

- ABDOMEN**, The part of the body containing the stomach and intestines.
- ABDOMINAL**, Pertaining to the abdomen.
- ABERRATION**, A state of partial insanity.
- ABNORMAL**, Irregular; unnatural.
- ABRASION**, The act of rubbing away by friction.
- ABSORBENT**, That which takes up or absorbs liquids.
- ABSORPTION**, Taking up substances from within or without the body.
- ACNE**, Pimples on the face, most common at puberty.
- ACROMEGALY**, A disease characterized by excessive increase in the size of the bones.
- ACROMYALGIA**, A rare nervous disease, usually causing paralysis and death.
- ACUTE**, Active, with rapid progress and violent symptoms, the opposite of chronic.
- ADOLESCENCE**, The time between puberty and full development.
- ADVENTITIOUS**, Added or acquired.
- AERATION**, The process of mixing with air.
- AEROBIC**, Pertaining to bacteria able to live in contact with air and to absorb oxygen.
- AFFERENT**, Conducting or bearing in; as an afferent artery.
- ALBUMIN**, A thick, sticky substance forming a part of animal fluids and solids, and resembling the white of an egg.
- ALBUMINOID**, Resembling albumin.
- ALBUMINURIA**, A disease of the kidneys, characterized by albumin in the urine.
- ALGEA**, A sea-weed.
- ALIENIST**, One skilled in the treatment of mental diseases.
- ALIMENTARY**, Pertaining to that which nourishes.
- ALKALOID**, A compound of alkali and some other substance.
- ALTERATIVE**, A remedy which by degrees changes the constitution, and restores to health.
- AMEBA**, One of the lowest forms of life.
- AMPUTATION**, Cutting off a limb.
- ANAEMIA**, A lack of blood, or of red cells in the blood.
- ANARSARCA**, A diffusion of serous fluids into the connective tissues; a general dropsy.
- ANASTOMOSIS**, The opening of the vessels of one system into those of another, as the union of the arteries and veins.
- ANATOMICALLY**, As regards structure; pertaining to anatomy.
- ANATOMY**, The structure of the body with reference to its parts.
- ANEROBIC**, Pertaining to bacteria that live without air.
- ANAESTHETIC**, A medicine or agency that prevents feeling.
- ANGLÉSIA**, Inability to feel pain.
- ANODYNE**, A medicine which relieves pain.
- ANTIDOTE**, That which counteracts the effect of a poison when taken into the stomach.
- ANTERIOR**, Before; in the front position.
- ANTIFEBRILE**, A remedy which overcomes or cures fever.
- ANUS**, The opening at the lower end of the alimentary canal through which the excrement leaves the body.
- APHASIA**, Loss of the use of words, both spoken and written, without loss of the vocal organs or impairment of the mind, resulting from a brain injury.
- APOPLEXY**, Pressure upon the brain caused by a ruptured blood vessel.
- AQUA**, Water.
- AREOLA**, The colored ring around the nipple.
- AREOLAR TISSUE**, The network of fibers extending over the body and binding

- its organs together, and connecting the skin with the deeper tissues.
- AROMATIC**, A fragrant drug, usually having a pungent taste.
- ARRECTOR**, That which causes to stand.
- ARTERY**, A vessel which conveys blood from the heart.
- ARTHRITIS**, Inflammation of the joints.
- ARTICULAR**, Pertaining to the joints.
- ARTICULATION**, A joint.
- ASEPTIC**, Free from the living germs of disease, fermentation or putrefaction.
- ASSIMILATION**, Transformation into its own substance of matters foreign to the body.
- ASTRINGENTS**, Medicines which by contracting the tissues restrain excessive evacuations and hemorrhages; the opposite of laxatives.
- ATROPHIC**, Showing or undergoing atrophy.
- ATROPHY**, Wasting away because of imperfect nourishment.
- AUDITORY**, Pertaining to the hearing.
- AUTOMATIC**, Self-acting; not under control of the will.
- AUTOPSY**, Post mortem; the opening and examination of the body after death.
- AXILLA**, The arm-pit.
- AXIS**, An imaginary straight line passing through the center of a body and on which that body may be supposed to revolve.
- BACILLUS**, **BACILLI**, A rod-shaped bacterium.
- BACTERIA**, Microscopic organisms; disease germs.
- BENIGN**, Harmless.
- BILATERAL**, Having two sides.
- BILE**, A bitter, yellow, sticky fluid secreted by the liver.
- BILIARY**, Pertaining to the bile.
- BILIOUS**, A deranged condition attended by disordered bile.
- BLOODY-FLUX**, A disease characterized by frequent bloody stools.
- BRACHIAL**, Belonging to or resembling the arm.
- BROAD LIGAMENTS**, The folds of the peritoneum which support the uterus and contain the ovaries and fallopian tubes.
- BRONCHIAL**, Pertaining to the bronchi, or air tubes of the lungs.
- CACHEXIA**, A morbid condition of the body resulting from disease.
- CALCAREOUS**, Containing lime.
- CALCULUS**, **CALCULI**, A concretion formed by the deposit of solid matter, as soda, lime, uric acid, etc., usually in the reservoirs of the body.
- CAPILLARY**, A very minute passage or canal.
- CARBOLIZE**, To impregnate with carbolic acid.
- CARBURETTED**, Combined with carbon.
- CARCINOMA**, A cancer.
- CARDIAC**, Pertaining to the heart.
- CAROTIDS**, The large arteries in the sides of the neck.
- CARTILAGE**, A solid substance occurring in the joints, at the ends of the ribs, breast bone, etc.
- CASEIN**, Cheese curd; the part of milk containing nitrogen.
- CATAMENIA**, The discharge of the menses.
- CATARRH**, An inflammation of a mucous membrane, especially those of the air passages of the head and throat, accompanied by an exudation.
- CATHETER**, An instrument for introduction into the urethra to empty the bladder.
- CAUSTIC**, A medicine which destroys animal tissues.
- CAUTERIZE**, To burn or sear by means of heat or caustics.
- CAUTERY**, A burning or searing of the flesh.
- CELL**, A minute vessel or sac having membranous walls or sides, and containing fluid. Cells constitute the cellular tissues of animals and plants, and by their growth and reproduction make up the growth of these parts.
- CELLULITIS**, Inflammation of cellular tissue.
- CEREBELLUM**, The small or posterior brain.
- CEREBRAL**, Pertaining to the cerebrum.
- CEREBRUM**, The upper larger portion of the brain.
- CEREBRATION**, Action of the brain.
- CERVICAL**, Pertaining to the neck.
- CHOLESTERINE**, A fatty substance found in the bile.
- CHYLE**, Food digested and ready for absorption.
- CHYME**, The food after it has been acted upon by the gastric juices.
- CHRONIC**, Moderate, slow, continuing a long time.

- CICATRIX**, A scar formed in the process of healing.
- CICATRIZATION**, The process of healing.
- CILIA**, Small hairs.
- CIRCUMCISION**, Cutting off the prepuce of males, or the lesser labia of females.
- CLAVICLE**, The collar bone.
- CLINICAL**, Belonging to the bed; bedside.
- CLYSTER**, An injection.
- COAGULANTS**, Substances which cause coagulation or curdling.
- COAGULATE**, To harden and thicken like the white of an egg under the action of heat.
- COCCUS**, *PL.*, **COCCI**, A kind of bacteria.
- COCCYGEAL**, Pertaining to the coccyx.
- COCCYX**, The four lowest vertebræ of the backbone.
- COMATOSE**, Pertaining to coma; sleepy.
- CONCEPTION**, The first formation of the embryo.
- CONDIMENTS**, Substances used to give relish to food.
- CONGENITAL**, That which is born with one; a tendency dating from birth.
- CONGESTION**, An excessive supply of blood in a part or organ.
- CONTAGION**, Germs that transmit disease by contact direct or indirect.
- CONTUSION**, A bruise.
- CONVALESCENCE**, The period of recovery from an illness.
- CONVULSION**, An involuntary violent contraction of the muscular parts of the body.
- COPULATION**, Sexual intercourse.
- COROLLARY**, Something so closely following as to need no demonstration.
- CORPUSCLE**, An animal cell.
- CORTICAL**, Pertaining to the outer part or cortex.
- COSTAL**, Belonging to the ribs.
- CRANIAL**, Of the cranium.
- CRANIUM**, The skull.
- CRETINISM**, A state or disease of idiocy, often found in the Alps.
- CYANOSIS**, A bluish or dark color of the skin due to imperfect circulation.
- CYST**, A bladder-like sac usually containing poisonous matter.
- DEBRIS**, Broken pieces or rubbish left after the destruction of anything.
- DECIDUAL**, Likely to be shed at a certain stage of growth.
- DEFECATION**, Voiding of excrement from the bowels.
- DEGENERATION**, The act of becoming worse, or the state of being worse.
- DEGLUTITION**, The power of swallowing.
- DEJECTIONS**, Voided matter; excrement.
- DELIRIUM**, Insanity; frenzy; derangement.
- DELETERIOUS**, Poisonous; destructive.
- DENTITION**, The process of cutting teeth.
- DEPRESSED**, A medicine that allays irritation and pain; a sedative.
- DERMA**, The true skin or corium; also used of the skin in general.
- DEVITALIZE**, To deprive of vitality or life.
- DEXTRA**, The right side.
- DIAGNOSIS**, The determination of a disease by its characteristic signs.
- DIAPHORETIC**, That which causes perspiration.
- DIAPHRAGM**, The muscle separating the chest from the abdomen.
- DIASTASE**, A substance found in barley, oats and wheat after germination.
- DIASTATIC**, Pertaining to the separation of the main shaft of a bone from its epiphyses, separation of the skull bones at the sutures; pertaining to diastase.
- DIATHESIS**, A predisposing condition; a tendency.
- DIETARY**, Pertaining to diet.
- DILATION**, Enlargement of an opening or organ.
- DISINFECTANT**, Anything capable of destroying the life of disease germs.
- DISINFECTION**, The destruction of the life of infection.
- DORSAL**, Of or pertaining to the back.
- DOUCHE**, A dash of water; a current directed somewhat forcibly against some part of the body for cleansing or medicinal purposes.
- DYSMENORRHEA**, Difficult or painful menstruation.
- DYSPNOEA**, Difficult or labored breathing.
- ECLAMPSIA**, A convulsive disorder attending pregnancy.
- ECZEMATOUS**, Like eczema.
- EDEMA**, A puffed or swollen condition caused by an accumulation of serous fluid in the tissues.
- EFFERENT**, Bearing or conducting out.
- EFFETE**, Worn out; barren.

- EFFUSION**, The pouring out of fluid into a cavity of the body.
- ELECTROLYSIS**, Chemical decomposition by electricity.
- EMACIATION**, Being lean from the loss of flesh.
- EMBRYO**, The first elements of a young animal developed in the womb.
- EMOLLIENTS**, Medicines which allay outside irritation by softening the skin.
- ENDEMIC**, Peculiar to the people of a certain nation or locality.
- ENEMA**, An injection thrown into the rectum as a medicine or for nourishment.
- ENTERIC**, Belonging to the intestines.
- ENVIRONMENT**, The surroundings.
- EPIDERMIS**, The outer layer of the skin.
- EPIGASTRIUM**, The upper central part of the abdomen; the pit of the stomach.
- EPITHELIOMA**, An epithelial cancer.
- EPISTAXIS**, Bleeding from the nose.
- EPITHELIUM**, The layer of cells lining the alimentary canal and the passages connecting with it.
- EROSION**, The condition of being eaten or worn away.
- ERUCTION**, A belching of wind from the stomach.
- ERYSIPELATOUS**, Like erysipelas.
- ERYTHEMATOUS**, Pertaining to erythema, a disease of the skin.
- ESOPHAGUS**, The food passage leading into the stomach.
- EXCREMENT**, Matter discharged as useless from the body of an animal.
- EXCRETE**, To throw out or discharge.
- EXCRETIONS**, Effete matter thrown off from the animal system.
- EXCRETORY**, Pertaining to that which excretes or is excreted.
- EXFOLIATION**, Scaling or peeling of the skin.
- EXPIRATION**, The act of breathing out or expelling air from the lungs.
- EXSANGUINATE**, To make bloodless.
- EXTRAVASATION**, Pouring out; effusion.
- EXUDATION**, That which is discharged through the pores, as sweat.
- FACETTED**, Covered with facets or faces.
- FASCIA**, The thin covering which binds the muscles of the limbs to their places.
- FATUITY**, Imbecility; foolishness.
- FARINACEOUS**, Made of meal or flour.
- FEBRILE**, Feverish, like fever.
- FECES**, The excrement of an animal; the discharges from the bowels.
- FERMENTATION**, A decomposition produced either by the action of living organisms or by certain inorganic agents.
- FERMENTATIVE**, Causing fermentation.
- FERTILIZATION**, The act of impregnating or making the ovum fruitful.
- FETAL**, Pertaining to the fetus.
- FETID**, Having an offensive smell.
- FETOR**, Offensive smell.
- FETUS**, A young animal yet in the womb.
- FIBRIN**, A nitrogenous substance found in the blood and chyle.
- FIBROID**, Fibrous; like fiber.
- FILIFORM**, Having the form of a thread.
- FIMBRIA**, A fringe or fringing process.
- FIMBRIATED**, Fringed.
- FLATULENCE**, An accumulation of gas in the stomach or bowels.
- FOLLICLE**, A little sac, gland or cavity in an animal body, particularly in the skin.
- FOMENTATION**, A warm poultice, or warm wet cloths applied to ease pain.
- FUNCTION**, The peculiar action or purpose of a special organ or part.
- FUNGUS**, *PL. FUNGI*, A low order of plants; a morbid growth.
- GALVANISM**, Electricity produced by a chemical battery, the same as voltaic electricity.
- GALVANIZATION**, The process of subjecting to the action of galvanic electricity.
- GANGLION**, *PL. GANGLIA*, A collection of nerve cells from which nerve fibers radiate.
- GANGRENE**, The first stage of mortification of the softer structures of the body.
- GASTRALGIA**, A neuralgia of the stomach; bellyache.
- GASTRIC**, Pertaining to the stomach.
- GASTRO-INTESTINAL**, Pertaining to the stomach and the intestines.
- GENERATION**, The act of begetting young.
- GENITALS**, The organs of generation; sexual organs.
- GERMICIDE**, Anything capable of killing germs.
- GERMINAL**, Pertaining to a germ.

- GESTATION, Pregnancy.
- GIGANTISM, Of abnormally great size.
- GLANS, Apex of the penis.
- GLOTTIS, The opening from the throat into the windpipe.
- GLYCOGEN, Animal starch.
- GRANULAR, Composed of granules or grains.
- GRANULATION, The process of forming grains or granules.
- HABITUE, One accustomed to a particular place or employment.
- HAEMATURIA, Blood in the urine.
- HECTIC FEVER, A fever accompanying great exhaustion.
- HEMOGLOBIN, The red substance of the red blood corpuscles.
- HEMORRHAGE, A discharge of blood from a blood vessel.
- HEMORRHOIDS, The piles; painful bunches or tubercles about the anus.
- HEPATIC, Pertaining to the liver.
- HEREDITARY, Transmitted from parent to child.
- HEREDITY, The transmission of a tendency from parent to child.
- HYALINE, Transparent, resembling glass.
- HYGIENE, The principles or laws of health.
- HYGROMETER, An instrument for showing the proportion of moisture in the air.
- HYPERPLASIA, Overgrowth of a part from increase of cells.
- HYPERTROPHY, Overgrowth.
- HYPEREMIA, An over abundance of blood in any part of the body; the unnatural fullness and redness immediately preceding inflammation.
- HYPERTROPHIC, Tending to hypertrophy.
- HYPOCHONDRIASIS, Low spirits; a morbid state of the mind.
- HYPODERMIC, Introduced or found under the skin.
- HYPOGASTRIUM, The lowest part of the abdomen.
- IDIOPATHIC, Independent of any other disease.
- IDIOSYNCRASY, The constitutional peculiarities of an individual.
- ILIAC REGIONS, The sides of the abdomen between the ribs and hips.
- IMBECILE, Weak; feeble in body and mind.
- IMMUNE, Exempt from a disease.
- IMPLICATE, To bring into connection with.
- IMPREGNATED, Made pregnant.
- INANITION, Exhaustion from lack of food or nutrition.
- INCONTINENCE, Inability to retain, as loss of control over the urinary bladder.
- INCUBUS, A sensation of trouble during sleep; nightmare.
- INDIGENOUS, Born in or native of.
- INCUBATION, The time between the exposure to a contagious disease and the beginning of the resulting attack.
- INFECTION, Living germs which leaving one animal and coming in contact with another may cause the disease in the second with which the first was affected, without the two animals coming in contact with each other either directly or indirectly.
- INFECTIOUS, Pertaining to infection.
- INFILTRATE, To enter through the pores.
- INFLAMMATION, A morbid condition usually characterized by pain, heat, redness and swelling. In scientific language, inflammation is designated by adding *itis* to the name of the part affected, thus meningitis or inflammation of the meninges, tonsillitis or inflammation of the tonsils, etc.
- INGUINAL CANAL, A canal situated in the groin, through which the spermatic cord passes.
- INHALATION, The breathing of steam or some medicated vapor.
- INJECTION, A quantity of liquid thrown into a cavity of the body for medicine or nourishment.
- INOCULATION, The communication of a disease to a person by inserting virus into his skin or blood.
- INSPIRATION, The act of inhaling or breathing in air.
- INTENTION, To heal by first intention is to heal without suppuration.
- INTERCOSTAL, Between the ribs, used of muscles, nerves etc.
- INTERMITTENT, With an interval. Applied to a fever that goes and returns, or to a pulse that misses a beat.
- INTESTINE, The canal or tube extending from the stomach to the anus.
- INTERVERTEBRAL, Located between the vertebrae.
- INTRAPELVIC, Within the pelvis.

- INVOLVE, To implicate or include.
- INVOLUTION, Contraction to natural size.
- IRRITANTS, Things that irritate, causing pain, heat or tension.
- KOUMIS, A liquor obtained from fermenting mare's or camel's milk.
- LABOR, Childbirth.
- LABIA, Lips.
- LACERATE, To wound; to tear.
- LACHRYMAL, Pertaining to tears, or secreting or conveying tears.
- LACTATION, The time of giving suck; nursing.
- LACTEAL, One of the vessels which take up and convey milk.
- LANUGO, The coat of downy hair covering the human fetus.
- LARYNGITIS, Inflammation of the larynx.
- LATRINE, A camp privy.
- LAXATIVE, That which produces looseness of the bowels; gently cathartic.
- LESION, A morbid change in the texture of an organ; an injury of structure caused by disease.
- LEUCOCYTE, A white blood cell.
- LEUCORRHOEA, A uterine catarrh accompanied by a whitish or yellowish discharge from the vagina.
- LEVATOR, That which lifts up or erects.
- LIBIDINOUS, Impure; licentious.
- LIGAMENT, A strong substance binding one bone to another.
- LIGATURE, A cord for tying a blood vessel.
- LITHEMIA, A condition of the blood in which uric acid is found in excess.
- LITHIASIS, The formation of stony concretions in any part of the body.
- LUMBAR, Near the loins, or back part of the waist.
- LUMBOSACRAL, Pertaining to the sacral region of the back.
- LYMPH, A colorless animal fluid found in the vessels called lymphatics.
- LYMPHOIDAL, Having the nature of lymph.
- MACERATE, To soften and separate the parts, as by steeping.
- MALAISE, The discomfort often experienced before or at the beginning of a disease.
- MALARIA, The poison caused by the germ *plasmodium malaria*.
- MALIGNANT, Virulent, tending to cause death.
- MALPIGHI, The discoverer of the glands in the kidneys which secrete the urine, in honor of whom they are called the Malpighian glands.
- MAMMARY GLANDS, The breasts or milk-secreting organs.
- MARASMUS, A wasting of the flesh without any apparent disease.
- MASTOID, Resembling the breast or nipple of a woman.
- MASTICATION, The act of chewing the food and mixing it with the saliva.
- MEATUS, A duct or passage of the body.
- MECONIUM, The first feces of infants.
- MEDULLA, The central axis, pith or marrow.
- MEDULLARY, Pertaining to the marrow.
- MELANOTIC, Pertaining to a morbid deposit in the organs of the body.
- MENORRHAGIA, An excessive menstrual discharge.
- MENSES, The periodic flow of bloody fluid from the mucous lining of the uterus.
- MENSTRUATION, The discharge of the menses.
- MESENTERY, A membrane which holds the intestines in position.
- METASTASIS, A sudden change of disease from one part of the body to another.
- METASTATIC, Of or pertaining to change of substance or place.
- METRITIS, Inflammation of the middle coat of the uterus.
- MICROBE, A microscopic organism; a bacterium.
- MICRO-ORGANISM, A disease germ, a microbe.
- MICROSCOPY, The art of using the microscope.
- MICTURITION, The act of urinating, or making water.
- MOBILITY, Easily movable.
- MUCUS, The sticky, slimy fluid secreted by the mucous membranes.
- MUCOUS MEMBRANE, The thin web-like lining of the canals and cavities which secretes a mucilaginous fluid by which it is kept lubricated.
- MUMMIFIED, Dried or become like a mummy.
- NARCOTICS, Medicines which by their operation on the brain and nerves diminish sensibility and induce sleep.
- NARES, The nostrils.

- NAUSEA**, Sickness of the stomach with a tendency to vomit.
- NECROSIS**, The death of a piece of tissue. The term is applied to bones as gangrene is to flesh.
- NEPHRITIS**, Inflammation of the kidneys.
- NEURITIS**, A disease of the nerves. See page 733, Ner. Dis.
- NEUROLOGIST**, One who describes the nerves.
- NEURON**, A nerve cell and its attached fiber.
- NEUROSIS**, PL. **NEUROSES**, A disease of the nerves without lesion of the parts, as neuralgia.
- NODULE**, A rounded mass.
- NORMAL**, Healthy, natural.
- NOXIOUS**, Harmful; unwholesome.
- NUCLEI**, Plural of nucleus. A kernel or center about which anything is formed or collected.
- NUCLEOLUS**, A little nucleus, a nucleus of a nucleus.
- NUTRIENTS**, Substances which nourish.
- NUTRITION**, The process by which food is digested and assimilated.
- OBESE**, Very fat or corpulent.
- OBSTETRICS**, The science of midwifery.
- OCCCLUSION**, The act of closing up, or the state of being closed.
- OCCLUSIONAL**, That which covers or closes up an opening.
- OCULAR**, Pertaining to the eye.
- OLFACTORY**, Of the sense of smell.
- OPHTHALMIA**, Inflammation of the eye.
- OPHTHALMIC**, Belonging to the eye.
- OSSIFICATION**, The process of changing into bone.
- OVARIAN**, Pertaining to the ovaries.
- OPIATE**, A medicine which produces sleep.
- OVoid**, Shaped like an egg.
- OVULATION**, The process of discharging an ovum by an ovary.
- OVUM**, The egg or body formed by the female in which after impregnation the fetus develops.
- OXIDATION**, The process of uniting with oxygen.
- PALLIATIVE**, That which alleviates pain, but does not cure.
- PALUDAL**, Pertaining to marshes or swamps.
- PANCREAS**, One of the digestive organs; the sweetbread.
- PANCREATIN**, One of the active ferments of the pancreatic juice.
- PAPILLOMA**, A kind of tumor.
- PAPILLOMATOUS**, Of the nature of a papilloma.
- PAPULAR**, Covered with pimples.
- PARALYSIS**, Loss of voluntary motion; palsy.
- PARASITE**, A plant or animal which lives upon and gets its nourishment wholly or in part from some other plant or animal.
- PARASITIC**, Like a parasite.
- PARENCHYMA**, The spongy porous mass of an organ.
- PARIETES**, Walls, as the abdominal parietes.
- PATHOGENIC**, Generative of diseases.
- PAROXYSM**, A sudden increase of symptoms; a fit.
- PATHOLOGICAL**, Pertaining to pathology or knowledge of diseases.
- PATHOGNOMONIC**, Characteristic of disease.
- PATHOLOGY**, The science of diseases.
- PELVIS**, The bone framework of the lower part of the body, enclosing the internal urinary and sexual organs.
- PEPSIN**, A ferment formed in gastric juice in the colon.
- PEPTINOID**, A compound formed by the action of pepsin upon nitrogenous food.
- PERENNIAL**, Perpetual.
- PERICARDIUM**, The membrane which encloses the heart.
- PERINEAL**, Pertaining to the perineum.
- PERINAEUM**, The space at the lower end of the body between the anus and the genital organs.
- PERIODIC**, Returning regularly after a certain period of time.
- PERIOSTEUM**, The membrane surrounding the bones.
- PERIPHERAL**, Pertaining to the periphery or outside.
- PERISTALSIS**, An involuntary, contractile, successive movement of the alimentary canal, whereby its contents are gradually driven toward the point of their expulsion.
- PERITONEUM**, A serous membrane lining the abdominal walls and forming the

- outer coat of the stomach, intestines, liver, spleen, ovaries, uterus and bladder.
- PERSPIRATION, Sweat.
- PESSARY, An instrument for holding the uterus in its natural position.
- PEYERIAN GLANDS, The agminate glands of the small intestine, so named in honor of Peyer, their discoverer.
- PHENOMENON, PL. PHENOMENA, anything remarkable.
- PHILEGMATIC, See page 562.
- PHRENIC, Pertaining to the diaphragm.
- PHTHISIS, Consumption of the lungs.
- PIGMENT, Any organic coloring matter.
- PIGMENTATION, Discoloration by the deposit of pigment in the cells.
- PLACENTA, The afterbirth; the soft disc by which the mother is connected with the fetus and through which she supplies it air and nourishment.
- PLASMA, The liquid part of the blood as distinguished from its corpuscles.
- PLETHORA, The state of being over full; excess of blood.
- PLEURA, The membrane which lines the cavity of the chest and encloses the lungs.
- PLEXUS, A network of vessels or nerves.
- POLYP, A many footed animal.
- POLYPOID, Like a polypus, or tumor having a small base.
- POPLITEAL, Back part of the knee joint.
- POSTERIOR, Situated behind.
- POST-MORTEM, After death.
- POTENTIAL, That which may be possible.
- PRECORDIAL, Pertaining to the parts before the heart.
- PREGNANT, Being with young.
- PREPUCE, A prolongation of the skin covering the penis or clitoris.
- PROCREATION, The begetting of young.
- PROLAPSUS, A falling down of some internal part of the body.
- PROLIFERATE, To grow by multiplication of cells or elementary parts.
- PROPRIETARY, That belonging to a proprietor or owner.
- PROSTATIC, Pertaining to the prostate.
- PROSTATE, A gland surrounding the urethra, just below the neck of the bladder, in males.
- PROTEAN, Very changeable.
- PROTEID, A food-stuff whose principal service is to renew or build up the soft tissues of the body.
- PROTOPLASM, The albuminoid substance constituting the physical basis of life.
- PROTOZOA, A primary division of the animal kingdom, consisting of a single cell, or group of cells.
- PROTUBERANT, Extending outward; protruding.
- PSOROSPERMOSIS, A kind of parasitic disease.
- PSYCHIC, PSYCHICAL; Pertaining to the mind or soul.
- PROMAINE, An alkaloid, usually poisonous, derived from decomposing animal matter, or produced by disease germs in a living body.
- PUBERTY, The age at which persons become capable of begetting or bearing children.
- PUBES, The part of the lower portion of the body that is covered with hair at puberty.
- PUERPERAL, Pertaining to childbirth.
- PULMONARY, Pertaining to the lungs.
- PULSATION, Throbbing, as the beating of the pulse.
- PURGE, To cause frequent and excessive evacuations of the bowels.
- PURULENT, of the nature of pus or matter.
- PUS, Purulent matter; the thick, sticky fluid formed by the process of suppuration.
- PUSTULAR, Covered with pustules or blisters.
- PUTREFACTION, A process of decay caused by minute organisms.
- PUTRESCIBLE, A body that decomposes at a certain temperature.
- PYROGALLIC, Obtained from gallic acid by the action of heat.
- PYLORUS, The opening in the stomach through which food passes into the intestine.
- RECTAL, Pertaining to the rectum or lower part of the large intestine.
- REFLEX, Turned or thrown backward; reactive; a result of reaction.
- REGENERATION, To form into a new or better state.
- REGURGITANT, Pertaining to regurgitation.
- REGURGITATION, An easy vomiting of food.
- RENAL, Pertaining to the kidneys.
- REMITTENT, That which has remissions, or abates from time to time, applied

- to a fever which does not quite disappear, and which increases again and again.
- RESIDUUM**, That remaining after a process of separation.
- RESPIRATORY**, Pertaining to respiration or breathing.
- RETCH**, To try to vomit; to strain.
- RETE**, A vascular network.
- RETICULAR**, Like a net.
- RETINA**, The expansion of the nerve of sight, within the eye, on which the images of external objects are thrown.
- RETINITIS**, Inflammation of the retina.
- RIGOR**, A chill; a sudden coldness introductory to many diseases.
- SACRAL**, Pertaining to the sacrum.
- SACRUM**, The triangular bone forming the back part of the pelvis and terminating the backbone; the lowest part of the spine.
- SALINES**, Medicinal salts, mostly laxative.
- SALIVA**, Secretion of the salivary glands; spittle.
- SALIVATION**, A continued and unhealthy flow of saliva.
- SALUBRIOUS**, Favorable to health; healthy.
- SANITATION**, Measures to secure and preserve health.
- SANIOUS**, Thin, serous and slightly bloody, as the sanious discharge of an ulcer.
- SCARLETINOID**, Like scarlet fever.
- SCLEROSIS**, The hardening or thickening of a tissue.
- SCLEROTIC**, Hard, firm; the white outer coat of the eye.
- SCROTUM**, The bag containing the testicles.
- SEBACEOUS**, Like fat; pertaining to fat.
- SECRETE**, To form or separate from the circulating fluids of the body.
- SECRETION**, That which is secreted, or produced from the circulating fluids.
- SECRETORY**, Pertaining to that which secretes.
- SEDATIVES**, Medicines which diminish the power and velocity of the circulation of the blood by their action on the heart and large arteries.
- SEDENTARY**, Accustomed to sitting.
- SENILITY**, Old age.
- SENSORY**, Connected with sensation.
- SEPSIS**, Decomposition, rot. Contamination of an animal organism from ill-conditioned wounds, abscesses, or other breeding places of bacterial germs.
- SEPTIC**, Pertaining to any substance that produces putrefaction.
- SEPTICEMIA**, OR **SEPTEMIA**, A morbid condition of the blood due to the absorption of poison from putrefaction.
- SEQUELLAE**, Disorders resulting from a disease.
- SEROUS**, Watery.
- SEROUS MEMBRANES**, The membranes lining the closed cavities and secreting a watery, lubricating fluid.
- SERUM**, The clear yellowish liquid that separates from the clot when blood coagulates.
- SIGMOID FLEXURE**, An S-shaped curve in the large intestine.
- SINISTRA**, The left hand.
- SITZ-BATH**, A hip-bath.
- SPECIFIC**, That which exerts special action in the prevention or cure of disease.
- SPECIFIC DISEASE**, A communicable disease; a disease caused by living germs.
- SPERMATOOZA**, The male fertilizing element of an animal.
- SPINAL**, Pertaining to the backbone.
- SPLENIC**, Pertaining to the spleen.
- SPHINCTER**, A muscle which by contracting lessens or closes the opening of an organ.
- SPUTA**, The salival discharges from the mouth, including mucus from the nose, throat and lungs.
- STATIC**, Acting by weight only, without motion.
- STERILE**, Barren, unfruitful.
- STERTOR**, Snoring; hence stertorous breathing.
- STIMULANT**, An agent which increases the vital activity of an organ. When this effect is produced in all the organs or functions the agent is called a general stimulant; when limited to one or two organs, a local stimulant; when it affects only the part to which it is applied it is an irritant.
- STRANGURY**, Scanty or painful urination.
- STRIATE**, To mark with lines or grooves.
- STRICTURE**, A contraction in some passage of the body.
- STROMA**, The tissues forming the foundation or framework upon which the essential structures of an organ rest.

- STYPTIC**, Astringent; tending to check bleeding.
- SUBCUTANEOUS**, Under the skin; hypodermic.
- SUBINVOLUTION**, A hindered or incomplete return to normal dimensions, as of the uterus after childbirth.
- SUPPOSITORY**, A solid introduced into the rectum or vagina to be dissolved there for purposes of medication.
- SUPPURATION**, The process of forming pus.
- SUTURE**, A stitch or fastening to unite the lips of a wound.
- SYMPHYSIS PUBES**, The union of the two front pelvic bones.
- SYNCOPE**, Fainting.
- SYPHILITIC**, Like syphilis; infected with syphilis.
- SYSTEMIC**, Pertaining to the system or parts of the body.
- TAMPON**, A plug introduced into a natural cavity of the body to prevent discharges.
- TENESMUS**, A continued desire to empty the bowels or bladder, when there is little or nothing to be discharged.
- TENSION**, Stretch or strain.
- TENTACLE**, An organ of feeling or motion of an invertebrate animal.
- THERAPEUTICS**, That branch of medicine which relates to the treatment of diseases.
- THORACIC**, Pertaining to the thorax or chest.
- THYROID CARTILAGE**, A part of the larynx; Adam's apple.
- THYROID GLAND**, A substance or gland on the upper part of the windpipe.
- TONIC**, That which gives tone or strength to the system.
- TOXAEMIA**, Poisoning of the blood.
- TOXIC**, Poisonous.
- TOXINE**, Poison; especially poison produced by the action of germs.
- TRACHEA**, The windpipe.
- TRANSFUSION OF BLOOD**, The injection of blood from the veins of one into those of another.
- TRAUMATIC**, Caused by wounds or injuries.
- TROPHIC**, Of or pertaining to nutrition.
- TUBERCLE**, A small granular tumor or nodule resulting from the presence of the bacillus tuberculosis.
- TUBERCULOSIS**, A diseased condition of the system due to the presence of tubercles.
- UMBILICAL CORD**, The cord-like structure which conveys blood from the placenta to the fetus; the navel cord.
- UMBILICAL REGION**, The central part of the abdomen, round the umbilicus. Above it is the epigastric region, and below it the hypogastric.
- UMBILICUS**, The navel.
- URAEMIA**, An accumulation in the blood of poisons of the urine.
- UREA**, One of the constituents of urine, separated from the blood by the kidneys.
- URETER**, The tube or duct which conveys the urine from the kidneys to the bladder.
- URETHRA**, The canal by which the urine is discharged from the bladder.
- URTICARIAL**, Stinging, as with nettles.
- UTERINE**, Pertaining to the uterus.
- UTERUS**, The womb.
- VAGINA**, The canal leading from the vulva to the womb.
- VAGINAL**, Pertaining to the vagina.
- VAGINITIS**, Inflammation of the lining membrane of the vagina.
- VARICOSE**, Enlarged, as varicose veins.
- VASCULAR**, Pertaining to the vessels of the body, as of veins, arteries, etc., or consisting of such vessels.
- VASO-MOTOR**, See page 706.
- VENEREAL**, Pertaining to sexual intercourse.
- VENOMOUS**, Poisonous.
- VERNIX CASEOSA**, A greasy protecting coat covering the skin of the fetus in the later months of pregnancy.
- VERTEBRAE**, The twenty-four bones which constitute the spinal column.
- VERTEBRAL**, Pertaining to the vertebræ or backbone.
- VERTIGO**, Giddiness, dizziness.
- VESICLE**, A cyst, sac, or cell.
- VESICULAR**, Of or pertaining to vesicles, or small sacs or cysts.
- VIRUS**, Poisonous matter, the infection or contagion of disease.
- VIRULENT**, Extremely poisonous.
- VISCERA**, Two or more of the internal organs, more particularly the intestines.
- VIVIFIED**, Quickened with life.
- VULVA**, The external generative organs of the female.

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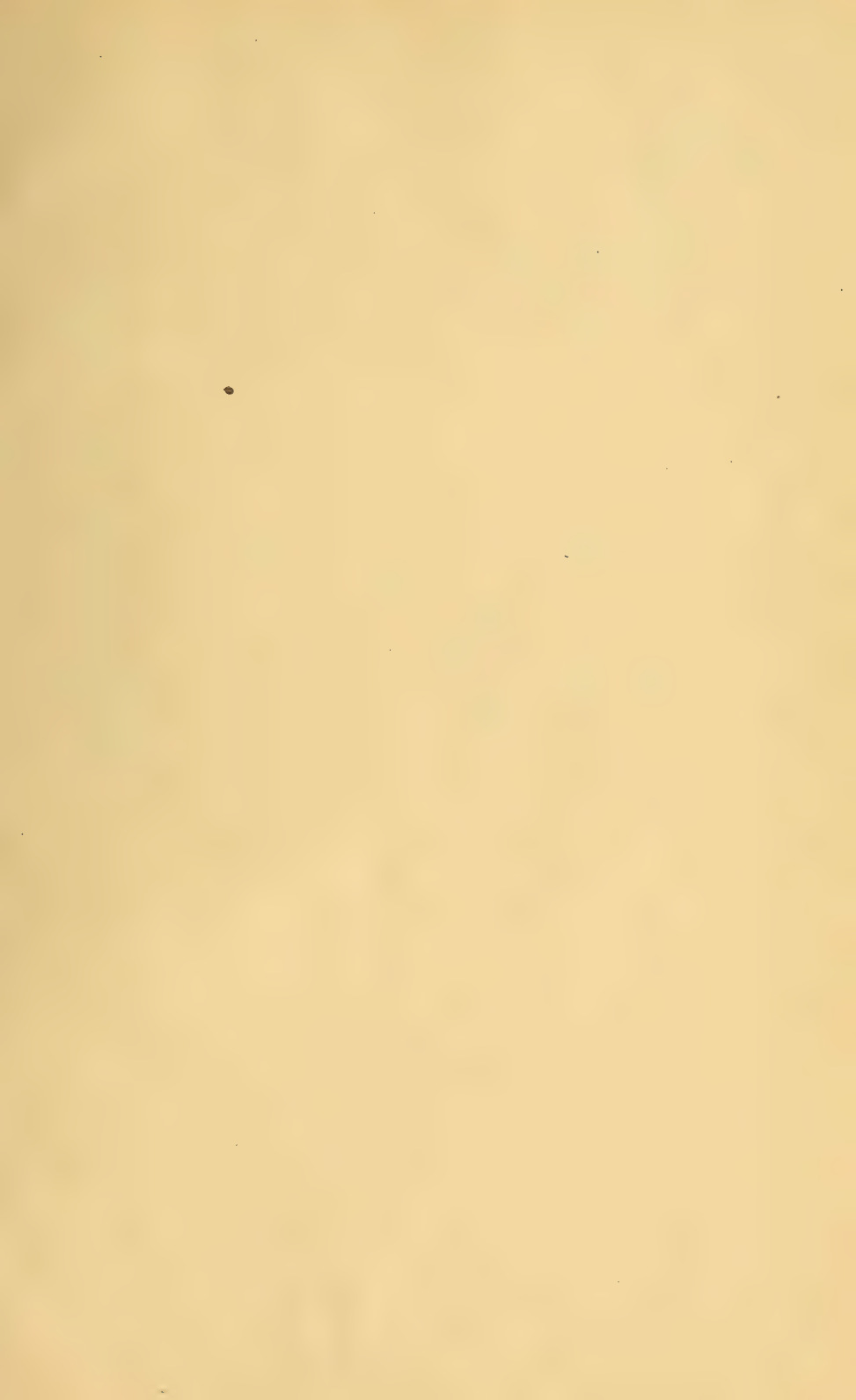
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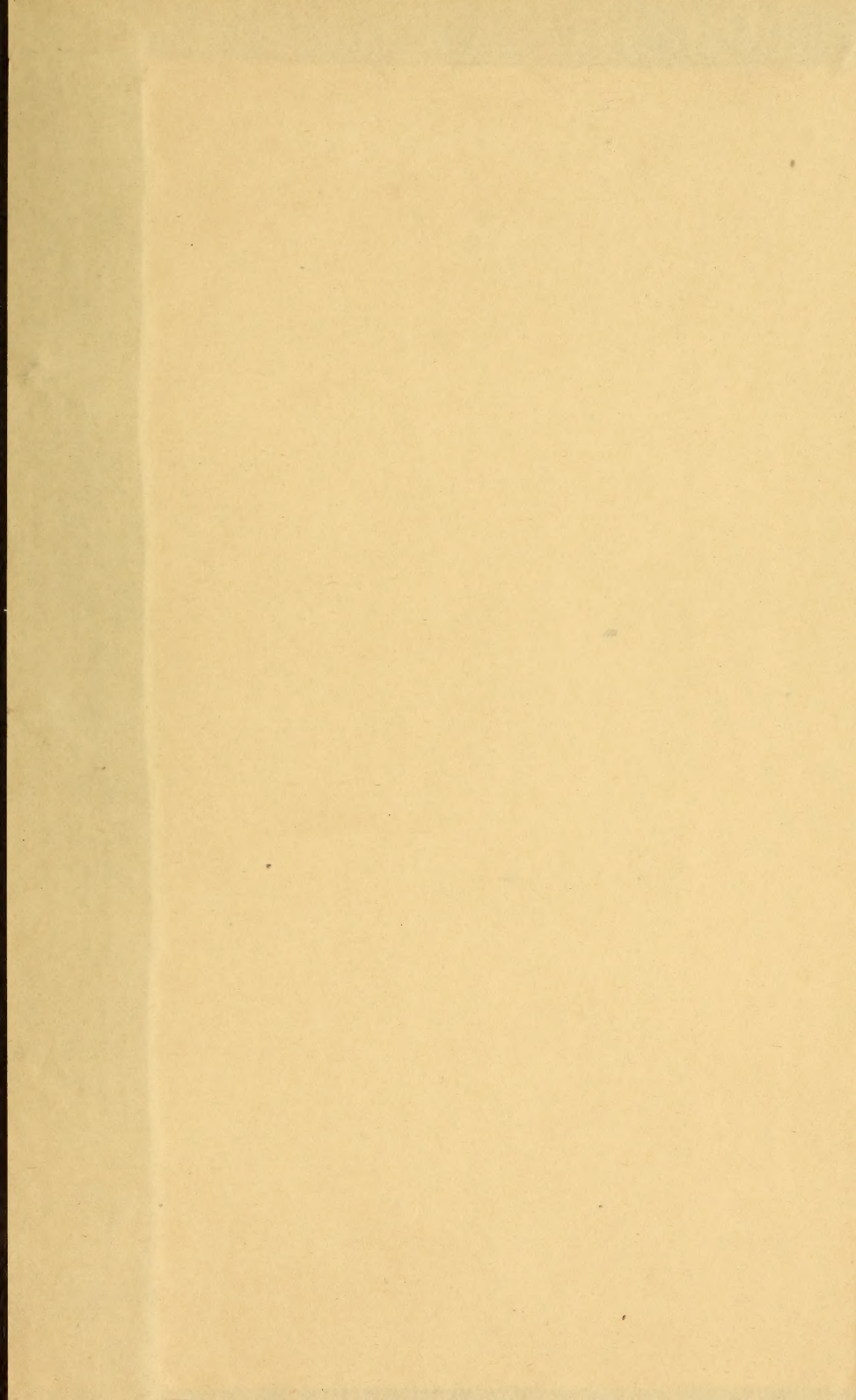
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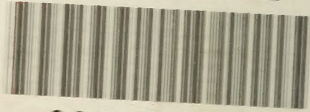
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